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PRINCIPLES OF SECONDARY EDUCATION

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PRINCIPLES

OF

SECONDARY EDUCATION

A TEXT-BOOK

BY

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THE STUDIES

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PRINCIPLES OF SECONDARY EDUCATION

PREFACE

EDUCATIONAL literature in English when not specifically limited to the elementary field is general — designed to cover every aspect of education. Specific consideration of the problems of the high school has thus far been confined, either to debate and printed discussion, or to reports by conferences and committees. The student is consequently unable to find in English any systematic presentation of the fundamental principles of American secondary education.

It is the aim of this volume to make an initial statement of such principles, in the form of a textbook for college and university classes.

That there is need for such a work in English is evident, whether we consider the magnitude of the interests now involved in the American high school, or the influence exerted by the monumental German works on gymnasial education, from Schrader to Baumeister, or the inadequacy of elementary professional training as a preparation for high-school teaching.

The most prominent purpose of the present volume is to reveal through an analysis of the content of the studies themselves their inherent and comparative educational value, and upon the basis of the values thus

established to determine the best possible combination of the studies into the various curricula now demanded by a democratic society.

A second purpose, of almost equal weight, is to show how, upon the basis of the proposition that education for insight must always be accompanied by training for efficiency, secondary education can most effectively perform its proper functions.

To facilitate the use of the text in college classes, to extend the student's view, and to enhance his interest, each prominent section is accompanied by topics for discussion. These topics relate to the immediate matter under consideration, and can be discussed without extended outside preparation. They assume only general knowledge and careful reflection. On this account, it is advisable to make intelligent discussion of the topics a part of the regular assignment.

Comparative study of curricula is made convenient by the insertion in the Appendix of representative programs of the various types of secondary schools in this and other countries.

As most becoming for a text-book, the present volume avoids novelties and efforts at 'contribution,' and confines itself to exposition and to argument that grows naturally out of analysis. It aims to set before the student the leading problems clustering about the studies of the secondary curriculum, and to furnish a guide to their rational solution. Needless, perhaps, to

say, our own and foreign literature on the subject has been freely consulted and as freely used.

The author wishes, also, to express his sense of indebtedness to his colleagues, Professors George L. Burr, Charles L. Durham, and G. M. Whipple, for their many helpful suggestions.

It is manifest that the entire field of the principles of secondary education is not covered by a consideration of the high-school studies alone. It is, therefore, the purpose of the author to prepare another work on the aims and processes of teaching them.

CORNELL UNIVERSITY,
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INTRODUCTION

PRESUPPOSITIONS UNDERLYING AMERICAN SECONDARY EDUCATION

I. THE SOCIAL BASIS

1. The Educational Ladder

1. The educational meaning of democracy is that every child shall have both incentive and opportunity to carry his educational development as far as his ability and circumstances will warrant, and in such direction as his taste, capacity, and situation in life may make desirable. For in education what is best for the individual is also best for society. Democracy, therefore, instinctively so adjusts its secondary to its primary schools that every child whatever his social status shall find the transition from elementary to secondary education both natural and easy. In form at least the American organization of schools provides opportunity for the continuous mental development of every citizen; for not only do all primary schools empty into the secondary, but the secondary likewise lead to the higher. We have, therefore, an educational ladder leading from the kindergarten up through the high school and from there branching off to higher institutions of all sorts. So far as organization is concerned, American democracy has pro-

vided for the inborn inalienable right of every child to the pursuit of knowledge. How far we are from realizing equality of educational opportunity, however, is only too well known.

DISCUSSION: — 1. Effect of low ideals and poor economic status of parents; 2. indolence of children; 3. inefficiency of teachers; 4. poverty of curriculum.

2. It might be supposed that every modern civilized state with parliamentary government would provide a similar educational ladder through its school organization; but this is not the case. No European nation, however violent its efforts, has been able to tear itself loose entirely from its social past. Social distinctions, which once amounted to a caste system, still make themselves felt in the adjustment of primary and secondary education even in Germany, France, and England. The secondary schools were first in the field, and were adjusted to the needs of the higher social classes, being confined since the renaissance mainly to the humanities. Then came democracy, now in the form of religious, now in that of political activity, and with democracy came the elementary schools for the common people. The two classes of schools have for the most part developed independently. The secondary schools have maintained primary departments in order to fit their pupils to do the higher work. In general, the so-called secondary schools of Europe form an independent

educational ladder leading from early, if not the earliest, primary grades to the university, with its general and professional departments, or to technical schools of higher grade. The elementary schools of these countries lead not at all to the secondary schools, but at best only to practical life on the lower planes, assisted, it may be, by continuation schools of a practical character. It is indeed possible to step from the common school[1] to the secondary at the end of the first three years in Germany, since the latter begins at nine years of age, but the difficulty of the transition increases with every year after that; for the higher school begins the study of foreign languages when the children are nine years old, whereas the common elementary school teaches no foreign language at all during its course of eight years. Professor Paulsen thinks that not more than one student in ten thousand passes to the gymnasium after completing his course in the common elementary school. To do so he would have to go back and begin the foreign languages with pupils four or five years younger than himself. Similar conditions obtain in France and England. Instead of one educational ladder for all the people, therefore, these countries have one for each social class. Democracy there is, of a certain sort, in the European system, for in any one of these countries, parents who have the desire, and the financial ability to do so, may start their children on the longer, more ex-

[1] *Volkschule.*

pensive, but socially higher educational ladder. The *Vorschule* of the German gymnasium, which begins when the children are six years old and leads to the gymnasium in a three years' course, is usually well filled; some of the children, at least, coming from the more prosperous homes of the lower social classes. Teachers, preachers, and other state officials located in villages where there are no secondary schools utilize the common elementary school for a number of years, supplement it by private instruction in foreign languages, and then send their children into advanced classes of some distant institution of secondary rank.

3. As will be seen later in Chapter II there are some distinct pedagogical advantages in the European system for those who are fortunate enough to enjoy the privileges of secondary education; but over against them we must set the incomparable advantage found in the American system, of providing a broad highway and an open door to all stations in life for every child.

DISCUSSION:— 1. Economic, political, and scientific benefits that arise from the American system. Give examples in history. 2. What similar advantages might an European claim for his system?

2. Types of Social Attitude

4. The high-school teacher should know something of the social world in which his students must live, and in

which they will have their part to play; for one of the main functions of education is to reveal to each student the origin, nature, and development of the social institutions, habits of thought, and modes of action best esteemed in his race, country, and time. The teacher should also understand that in their social attitude men are not all alike, nor is it perhaps desirable that he should try to make them so. These mental attitudes spring from many sources, both individual and general, immediate and historical. We already distinguish types of temperament, as the choleric and the phlegmatic; economic condition, as the rich and the poor; political status, as the free and the servile; cultural condition, as the educated and the uneducated. We may also likewise distinguish between somewhat permanent attitudes of men toward all kinds of institutions, social, political, and economic. These mental attitudes find their explanation, partly in natural bent of mind, and partly in economic and political conditions. Patten [1] has pointed out that under primitive conditions the struggle for existence has given rise to two main classes; namely, strong rulers and subservient followers; or as Carlyle might say, heroes and hero-worshippers. The leaders have always been tribute-takers and the followers tribute-givers. Leadership in primitive society takes two forms, military and clerical; hence there have always been two kinds of leaders namely, warriors and priests. Both have been persistent

[1] S. N. Patten, "The Development of English Thought," Ch. I.

tribute-takers, and both exist, though in modified form, at the present day.

DISCUSSION: — 1. Historical examples of strong leaders and servile followers; among Greeks, Romans, Norwegians, Danes, Normans, in the Feudal System, etc. 2. The chief characteristics of the two classes.

5. Professor Patten also shows that under modern political and economic conditions two other distinct types of citizens have been developed; namely, the class who seek to accomplish the ends they most desire through strong social coöperation, and the class who try to reach the same ends through independent effort. It can easily be seen that democratic government and economic conditions now render it possible to effect social or other common ends through group coöperation. This we see in labor organizations, in combinations of capital for doing business, in political parties, in social or religious reforms, etc. It is natural, therefore, that there should be a large portion of society who are passionately devoted to group co-operation as perhaps the only enduring form of efficient action, and who consequently are ready to convert where they can or to crush when they cannot convert. Again, modern democratic and economic society has given rise to not a few situations wherein those of independent turn of mind may freely utter their opinions without danger of social, political, or economic punishment. Once to be an

independent was to be a martyr; now to be an independent is, in the somewhat fantastic nomenclature of Professor Patten, to be a mugwump.

DISCUSSION: — Characteristics and modes of actions of these two classes in the political, the business, and the social world.

6. Though priest and warrior are still with us, and in a measure still exact tribute, they no longer dominate society as they once did, for the great tribute-taker of to-day is the capitalist, the exploiter of labor, land, coal, and iron; stocks, bonds, and public franchises. He is the man who heaps up colossal fortunes, and thus influences the welfare of countless thousands. Nor does the servility of the follower take the old primitive form of serfdom, but is to be detected in manifold mental and financial forms of tribute-giving.

DISCUSSION: — Specific illustrations of these two modern forms of the tribute-taker and the tribute-giver.

7. Since these distinctions are relatively new, there are no specific and well-recognized names for the several classes. Patten has chosen the following terms for them: clinger, sensualist, stalwart, and mugwump. The *clinger* is the servile follower, the tribute-giver; the *sensualist* is the energetic and often passionate leader, the tribute-taker; the *stalwart* is the vigorous group coöpera-

tor; and the *mugwump* is the independent, critical, sceptical individual.

DISCUSSION: — 1. May the same person belong to two or more classes? Thus, may he be a "stalwart" in religion, a "mugwump" in politics, a "sensualist" in business, and a "clinger" in society? 2. Is it more probable that he will have one predominant characteristic which will manifest itself in all that he does?

8. How far the teacher can or should attempt to form or modify these fundamental characteristics of the student is largely indeterminate. In considerable measure the personality of the teacher will have much to do with the influence he will have upon these traits of character. The meek fluffiness of the lamblike teacher will in itself hardly stimulate or even curb aggressiveness or independence. On the other hand if the teacher possesses any one of the three strong characteristics, he is likely to have a decided and often determining influence in a similar direction upon those who come daily under his tuition. But the teacher should at least be able to recognize and value those fine qualities of leadership, coöperative spirit, and independence, which characterize different groups of men; for, both in his personal intercourse with his students, and in the long course of instruction through which he will lead them, he will have abundant opportunity to curb those qualities that appear in excessive degree, and to stimulate those that may seem rudimentary.

DISCUSSION: — 1. Is the idea of harmonious development valid here? 2. Which is better, to try to develop the predominating characteristic or to strengthen the more rudimentary qualities?[1]

9. Whatever uncertainties may adhere to the topics touched upon in Section 8, of this there can be no question; namely, that leadership, coöperative spirit, and independence all depend for their effectiveness upon the various forms of group coöperation. When these forms are relatively stable, changing but slowly, we call them institutions. Examples are found in national, state, county, and city governments; in courts of justice; in religious organizations; in systems of education; in the customs and laws that provide for the founding and development of the life of the family. When the forms of organization are more or less unstable, being subject to rapid change, as in the economic world, we usually call them trusts, associations, stock companies, corporations, labor unions, etc. In similar manner we speak of social or philanthropic or reform organizations as circles, clubs, societies, unions, leagues, associations, parties, etc. Aside from the somewhat narrow field of purely individual effort, these are the means whereby men effect their will in the world. The student can hardly have a better introduction to the institutional mode of action than that found in Francis Lieber's old, yet ever fresh and valuable, work, "Civil

[1] See S. N. Patten, "Heredity and Social Progress," Ch. XIV.

Liberty and Self Government."[1] The fundamental reciprocal relations of the individual and society are set forth at length in the second volume of Professor Baldwin's work on the Development of Man.[2] The dangerous excesses that often arise when men give themselves up to mass influences, as in mobs, strikes, riots, and in lesser degree in the wild pranks of students themselves, are described in such works as those of Tarde[3] and Baldwin.

DISCUSSION:—Scope of group *vs.* individual action of lawyers, doctors, teachers, politicians, business men, and engineers.

3. Developed *vs.* Undeveloped Society

10. The extent and comprehensiveness of education, together with the variety of forms which it shall assume, depend in any given case upon the stage of development reached. Where the development has been rapid, as in the United States, and where new forces find society in a plastic state, the whole educational system may be gradually transformed to meet its new conditions. In older countries, however, where social caste perpetuates the older types of education, like the classical gymnasium in Germany, the Lycée in France, or the so-called public school, such as Winchester, Eton, Harrow, or Rugby, in England, the new educational needs are met by

[1] Chapters XXV–XXX.

[2] "Social and Ethical Interpretations," pp. 227–246.

[3] "Laws of Imitation," English translation.

new types of schools which spring up alongside the old. Thus, in Germany, one finds, besides the old classical institutions, the free schools for the common people, the middle schools, the higher schools for girls, industrial schools of many varieties, commercial schools, and higher schools for boys in which classics and modern linguistic and scientific studies are so adjusted as to form a compromise between the old and the new.

In those stages of social development in which people are still struggling to meet the first requisites for survival in the form of food, shelter, and clothing, and in which the averting of dangers real or imaginary, as war and pestilence, fear of evil spirits, etc., cause the inefficient many to subject themselves to the efficient few, education is necessarily confined to the upper classes, and may be greatly restricted in variety, as in Greece and Rome of old, and in Russia to-day. The educational situation, however, is very different in the modern industrial state. Here the old struggle for food, clothing, and shelter is so modified that most people live from the cradle to the grave without ever having been hungry as was primitive man, or having suffered for lack of clothing or shelter. Wars are rare and are humanely conducted, regular food-supply and sanitary science have banished the uncertainties of primitive life. Industries are greatly diversified, offering ever expanding opportunities for the exercise of initiative, energy, and invention. The banishment of the

twin evils, war and superstition, with their train of calamities, has rendered it unnecessary for the people to submit to the tyranny of a few strong leaders. They may now have the protection of constitutions and systems of law which meet their approval, and may, if they choose, secure the perpetuity and development of their social order through self-government. In such a state, the minds of the people are no longer directed primarily to the avoidance of calamities, but rather to the securing of greater and more numerous advantages. Even government itself is directed not so much to the warding off of evil as to promoting the welfare of the people. Policemen protect pedestrians in the cities, and soldiers aid in the rescue of life and property. State and national governments devote themselves to enterprises too great or too unremunerative for private enterprise, like the deepening of harbors or the irrigation of deserts. Population frequently almost doubles in a generation where the transition is just being made from an agricultural to an industrial state, as in Germany and the United States in recent times.

Under such conditions as those above described education, like all the means for sustaining both the elementary and the higher life, undergoes quite as radical transformations. It must in the first place be universal, elevating the whole people up to a certain standard of knowledge and efficiency, and must, moreover, keep open the high-

ways that lead to more knowledge and greater efficiency. Education must, then, like industry, become diversified, for a single type of educational institution no longer adequately meets the needs of a state so highly developed. Every important form of industrial and commercial activity, as well as every phase of institutional and professional life, demands its technically trained leaders, so that we must have schools, not only for statesmen, lawyers, doctors, and divines, but for engineers, architects, chemists, merchants, industrial workers of every grade, and even for foresters and agriculturists. Many of these phases belong to university training, but all of them have their roots in the high school. Modern education, therefore, in civilized countries, must utilize in adequate degree all the agencies furnished by ever developing systems of knowledge, both old and new. One can trace a circle of reciprocal causes and effects, each of which arises out of the others and in turn enriches them: — scientific invention and discovery; enlarged industrial efficiency and production; increased population and wealth; enriched educational means for promoting social and industrial well-being. It would in some respects be as great an educational error to neglect to use the means provided by modern scientific research in mathematics, natural science, history, language, etc., as it would be an industrial error to fail to use modern means for production and transportation. That there are wide differences

between the education of a human being and the production of an article of commerce must always be recognized; but, for all that, it must still be urged that education should be, and in the end will be, adjusted to the more permanent aspects of any given civilization, both as to means and ends. What these means are, and how these ends are to be reached, will be discussed in subsequent chapters.

DISCUSSION: — Comparison of life and education in colonial times with life and education in the United States to-day: government, church, agriculture, industries, commerce, manner of living, etc.; also classes educated, schools, studies, curricula, etc.

II. THE INDIVIDUAL BASIS

1. The Adolescent Period

11. Not only must education be adjusted in ends and means to the society in which we live, but it must also be adjusted to the individual to be educated. What this individual is, what intricately intermingled threads of heredity make up the warp and woof of his mind and character, what past environmental influences may have directed his aspirations and needs, we may perhaps be able only to surmise; yet the high-school student stands before us, a concrete entity, a being about whose nature we may learn certain important laws, and of whose individual educational needs adequate investigation will enable us to form some definite idea. Though genetic psychology, as President Jordan thinks, may be still in its infancy, and like other stages of infancy be subject to unwarranted hopes and fears,[1] yet the period of adolescence has been so extensively investigated, especially in the epoch-making work of President Hall,[2] that a thoroughgoing study of this period of development by

[1] See President Jordan's article in the April (1906) *Cosmopolitan* on "Sex in Education."

[2] G. Stanley Hall, "Adolescence." The following chapters have the most value for the student of high-school education: III, VII, XII, XIV, XV, XVI, XVII.

the future high-school teacher may fairly be demanded. This can be effected only through extensive reading, or better, through specific instruction in a class devoted to this one end. All that an introduction to the theory of high-school education can undertake is to point to some of the reasons why this topic is an important one in the professional preparation of high-school teachers.

12. Some there doubtless are, who, mistrusting the validity of the new investigations or doubting their importance, are disposed to regard adolescents from fourteen to eighteen as essentially the same boys and girls that they were from eight to twelve, only a little larger grown in stature and capacity. Though something may be said for this view, it must be fairly evident that not only does adolescence show differences of quantity, but that it also shows decided differences in quality of body, mind, and heart. The female high-school student, for example, enters the high school a young girl; she leaves it a young woman, capable of entering into any of the manifold relations of adult life, and with a mental and spiritual attitude quite different from the girlish one with which she began the high-school course.

DISCUSSION: — Cite facts indicating quantitative changes; qualitative.

13. In the first place, the physical development that takes place during the adolescent period from fourteen

to eighteen or nineteen has important consequences for secondary education, since it makes easily possible what was before practically impossible. By the time he is sixteen, the boy has nearly attained the stature of the man, and if accustomed to physical work or vigorous play, has also acquired the strength and muscular control requisite for the use of tools of precision. The period of successful manual training may therefore be said to coincide with that of the secondary school, for the requisite strength and control being available, the earlier such training begins the greater will be its success with a given amount of exertion. The physical and mental development that fits for manual training also fits for successful laboratory practice in the sciences. Only from a study of physical and mental characteristics of adolescence can the high-school teacher arrive at a just estimate of the kind and amount of work and play best adapted to the needs of high-school students.

DISCUSSION: — 1. Does the fact of physical efficiency in the young point to the need of its exercise? 2. Compare various types of schools in respect to the amount of physical exercise demanded; compare studies also in the same way. 3. Customs of English, German and American secondary schools with respect to physical exercise in play and work.

14. The mental attitude of the adolescent is also different in many respects from that of the child. The new studies open and expand the mind. History and language

point to an interesting and significant past; science begins to explain the physical present and to forecast a more brilliant future. The content of the daily thought about him begins to appear insignificant, and often an overwhelming self-conceit possesses the youth. He deems himself intellectually superior to his adult neighbors, because his thought dwells not so much upon the commonplace as upon the bold outlines of past, present, and future. He loves to dwell upon the large and striking, the romantic and ideal. He is hospitable to the new, the radical, and even to the revolutionary, but he has not so much love for the methodical, the exact, and the minute. These facts give important hints to the teacher, not only as to the subject-matter and method of instruction, but also as to the easiest ways of rousing interest and guiding the fermenting mind into ways of pleasantness and paths of peace. Hearty spontaneity is more effective with youth than even skilful technique, and for this reason it often happens that the professionally untrained university graduate attains a more real success in the high school than is at first possible to the promoted primary teacher with perfected elementary technique. From this it may be concluded that the professional preparation of the high-school teacher should differ from that of the teacher in the grades. If adolescents differ from children in quality of mind, body, and heart, why should not the preparation for their instruction and management likewise differ?

DISCUSSION: — 1. Is President Hall right in his contention that high-school physics should be more concrete and less mathematical?[1] 2. Does the intercourse of polite society furnish a model for that of the high school?

15. The youth differs from the child perhaps quite as much in quality of feeling as in that of mental attitude or physical efficiency. Many facts of primitive and contemporary life go to show that this is the period when religious feelings are most easily aroused and when they leave their deepest impress.[2] It is the period of confirmation in the churches, that in which most conversions take place, and, in primitive societies, it is that in which initiations into tribal life are effected with much ceremony and with tests of physical endurance.[3] Intense consciousness of self with its demand for recognition is present to the youth in a degree unknown to the child. This natural feeling of the importance of self is accented in America by the freedom of conduct generally allowed, and by early initiation into the thoughts and manners of the world through wide reading and through early participation in social functions. So widely do American differ from foreign youth in this respect, that it is only with reluctance that American adolescents are intrusted to a for-

[1] See "Adolescence," Vol. II, pp. 155–157.

[2] E. Starbuck, "Psychology of Religion"; also Hall, "Adolescence," Ch. XIV.

[3] "Adolescence," Vol. II, pp. 233–249.

eigner who has not had opportunity to become thoroughly acquainted with their characteristics.

DISCUSSION: — 1. Compare American adolescents with those of any foreign country in respect to the characteristics above mentioned. 2. Advantages and disadvantages of early social maturity.

2. Sensory *vs.* Motor Powers

16. That each normal human being is fitted with a dual system of nerves, the afferent and the efferent, the one leading from the periphery of the body and especially from the organs of sense to the sensory centres of the brain and cord; the other leading from the motor centres of the central system to the various parts of the muscular system, is a well-known fact. It can hardly be unconditionally asserted, however, that this fact has always been duly recognized in educational theory, or that even to-day its wide-reaching importance is fully appreciated; for in fact all important educational practices should depend upon sensory and motor reactions and their interrelations. Among the more fundamental factors to be considered we find the following: impression and expression, upon which Professor James[1] lays so much stress; knowing and doing;[2] clear ideas and vivid ideas;[3] manual training

[1] "Talks to Teachers," pp. 33–37.

[2] See Froebelian Literature.

[3] De Garmo, "Interest and Education," Ch. VI.

both as a general and as a special discipline; content and form;[1] in short, the whole problem of the relation of knowledge to efficiency.[2] It is likewise a well-known fact that individuals differ not only in the amount of their original endowment, but also in its distribution, some being stronger on the sensory-intellectual, some on the intellectual-motor side. What influence upon our educational means and methods the fact of this dual equipment and its frequently uneven distribution should have upon our educational practice can be discussed at length in subsequent chapters.[3]

DISCUSSION: — 1. The immediate and the wider implications of the dictum, "no impression without expression." 2. Should education recognize the antithesis between the thinker and the actor?

3. Adjustment of Education to the Needs of the Individual

17. The need for this personal adjustment is both psychological and social. It is social in that democracy sends into the high school promising pupils from every station in life, who will in turn fulfil the most diverse functions in the society of the immediate future. The

[1] Dewey, "The Ethical Element in Education," in the "Third-Year Book," National Herbart Society.

[2] S. N. Patten, "Heredity and Social Progress," pp. 164–180.

[3] See especially Chapter V.

inheritor of generations of culture sits beside a youth, all of whose ancestors were illiterate European peasants. The future leaders in all classes of society in every type of occupation or profession must get their secondary education in the same high school. And this social need but emphasizes the psychological one arising from diversity of talent and taste that is felt even where the students come from a single social stratum, but which becomes imperative where social and physical ancestry are so diverse as is the case in a democracy like that of the United States. It is the recognition of this diversity of talent and destination that has led to the successful introduction of the elective system in American universities and high schools. The adaptation to individuals that we thus effect is sought in European countries in diversity of schools, each of which seeks to adjust itself to varying needs of different classes of the population. Adjustment of secondary education to personal needs is rendered all the more imperative because of the ease with which it can now be effected. The development of modern science and the multiplication of facilities for imparting its results to students in the universities make it easily possible to prepare teachers for every important department of human learning, so that whenever there is a demand there is sure to be a supply to meet it. When both teachers and subject-matter are at hand, it is not difficult to fit high-school teaching to the diverse

needs that arise from the universalizing of secondary education.

DISCUSSION: — 1. Contrast between the fixed curriculum of the European secondary school and the elastic one found in the United States. 2. Is diversity in curriculum gained at the expense of efficiency?

PART I

THE STUDIES OF THE SECONDARY SCHOOL

CHAPTER I

BASES FOR SELECTION

1. How Selected in the Past

18. The history of education shows that the secondary curricula of the past have been chosen chiefly with respect to three things, namely: (1) The status of the persons to be educated; (2) the ruling ideals of the time, nation or curriculum maker; (3) the range of suitable knowledge available. Applying these categories with respect to the Spartans; the Athenians; the Romans, as, for instance, in the time of Quintilian; the Italians in the early renaissance; the Germans in the time of Sturm; the English in their so-called public school system of secondary education for the sons of nobles and gentry since 1688; one can understand why they did what they did. In similar fashion one may apply these tests to the many reform systems that have been proposed. Thus, with Plato in his "Republic" the ruling ideal is, *Up to philosophy!* The persons to be educated are those who remain after a long series of siftings; the material available for this stage and fundamental to philosophy consists of music, literature, grammar, rhetoric, and geometry. With Rousseau in his "Émile" the ruling ideal is, *Back to nature!*

Here the persons to be educated are the children of those who have been corrupted by society, *i.e.*, the upper classes, and the material consists of suitable selections from the arts and sciences that neither corrupt nor have been corrupted. With Spencer in his "Education" the ruling ideal is, *On to science!* Secondary education with him applies to all who have capacity, means, and ambition to avail themselves of its advantages. The material available and most suitable because most conducive to complete living is science; first natural, and then historical and social.

DISCUSSION: — Application of the foregoing tests in detail to the cases suggested.

19. The three factors, social status, ideals, and materials, will doubtless determine the curricula of the future as they have those of the past, while their great variability will continue to give rise to differences of opinion as to the relative weight that should be given to this or that element of the problem. Even among the Athenians there was not unanimity of opinion concerning the ends and means of education, for Aristotle in his "Politics" remarks, "In our times men contend about the purposes of youthful training; they are not united as to what our youth should learn, whether that which enables them to attain virtue or happiness in life; nor is it decided whether one should work more for the

development of the intelligence or of character; the education of the day leaves the question in doubt and makes no decision as to whether one should favor what pertains to the demands of life or to the attainment of virtue or should favor studies even that extend beyond these ends. Each of these views has found advocates." [1]

The past is fairly united, as is the present, in the proposition that secondary education should be more general than special, that it should serve as the prolegomena for future study, laying a sure foundation of knowledge and skill for subsequent specialization. But no lesson is more certainly taught by the history of the educational past than the futility of trying to establish a single curriculum that shall be valid for all men at all times; for even when one of the three factors, as that of ideals, is subject to variation, there must arise the state of opinion described by Aristotle. When, however, ideals vary, and the classes of persons to be educated include every station in life, and the suitable material available for study is indefinitely multiplied, this futility appears with threefold force.

DISCUSSION:—Compare the fixed curriculum of the English "public school," as at Rugby, with the elastic curriculum of the American city high school, showing how the three leading factors vary in the two cases.

[1] Aristotle, "Politics," VIII.

2. The Argument for Concentration in the Narrow Fixed Curriculum

20. Wherever in the past the leading aim of education has been clearly defined and so important as to overshadow all subsidiary aims, and when, moreover, a few studies have greatly outranked all others in their contribution to this aim, we find the fixed curriculum, which lasts until fundamental aims or conditions change. Examples are found in the Spartan education; in that of Athens before the rise of philosophy; in scholastic education; among the Jesuits, whose curriculum remained essentially unaltered for two hundred years; in the English public schools from the coming of William of Orange until the days of Thomas Arnold; also in many stages of humanism in other times and countries. As soon, however, as ideals or conditions so change that the validity of the established curriculum is disputed, the advocates of the old are thrown on the defensive. For they are called upon to defend the system under which they have grown up and of whose beneficent effect they are absolutely certain.

The argument then runs as follows: This system has been tried and not found wanting; it was good enough for our fathers, and will prove equally valuable for our children. The proposed new system is revolutionary and will destroy our most cherished institutions, our

educational heritage.[1] When impelled to give more definite reasons why newer studies should not partially or wholly displace the old, the advocates of the established curriculum invariably urge the superiority of the old studies for the training of the mind. "Behold the giant intellects of the past!" they exclaim. "This is the meat upon which they fed. Their faculties were thereby adequately developed. Faithful and efficient in these few things, they were made rulers over many things. Minds made strong by these studies, like muscles strengthened by a few exercises, are capable of doing any work that may be demanded of them; intellects thus made keen, like the well-sharpened knife, can cut anything; power thus generated can be applied in any department of life, as the electricity concentred in a storage battery can be made to yield motion, heat, or light." Curiously enough, the advocates of new studies are at first disposed to admit the validity of the argument for formal intellectual training, but to urge that what they propose will do the same thing, besides having the advantage of being better adapted to modern needs. This has been one of the grounds upon which the introduction of electives into the course of study has been defended.[2]

[1] See complaint of Aristophanes over the new education in Athens after the rise of Philosophy; Davidson, "Education of the Greek People," pp. 92–95.

[2] See "Report of the Committee of Ten," pp. 52–53, 56–59.

Thorndike quotes extensively from influential writers on psychology and on education to show the wide prevalence of the idea of formal discipline as a settled educational doctrine.[1]

21. It is only in recent years that the doctrine of the formal discipline of the mind has been seriously examined and its validity qualified or even denied. The first in Europe to do this were the followers of Herbart, on the ground that since all mental exercise takes its rise in a definite mental content, its character is necessarily determined by its origin, so that it would be absurd to assume that thinking power developed by the study of mathematics, for instance, would as such have any validity in that, say, of biology. Biological thinking to have any worth must spring from a biological content.[2] The first study of the problem in the United States was made by the late B. A. Hinsdale, of Michigan University, in a paper read before the National Council of the National Educational Association at Asbury Park, N.J., 1894.[3] After careful analysis of the doctrine as applied to sense apprehension, memory, imagination, logical thought, and volition, with abundant use of literary and historical

[1] "Educational Psychology," pp. 82–84.

[2] See article, "Formale Bildung," in Rein's "Cyclopädie der Pädagogik."

[3] B. A. Hinsdale, "The Dogma of Formal Discipline," N. E. A. Report for 1894; also in *Educational Review* for September, 1894; also in Hinsdale, "Studies in Education."

citations, the writer comes to the conclusion that mental power developed in any one field of thought cleaves to that content so far as its chief field of exercise is concerned, but that there is some overflow into congruent channels, just as exercise of the muscles of any part of the body, say of the right arm, probably strengthens somewhat the whole muscular system. All mental power is therefore more special than general, for it becomes general only in so far as other fields of thought are congruent, or related, to those out of which the power was developed. Hinsdale's conclusions, derived from analysis and experience, coincide substantially with those deduced by the Herbartians from psychological premises. More recently the doctrine has been subjected to practical experiment, in order to show how far the training of any mental function improves other mental functions. These experiments and investigations of a considerable number of psychologists are adequately described by Thorndike, and confirm the conclusions of Hinsdale and the German Herbartian writers.[1]

O'Shea has treated this topic at length in his "Education as Adjustment,"[2] as has Bagley in his volume entitled "The Educative Process."[3] Both agree with the earlier criticisms of the doctrine. O'Shea ascribes the

[1] E. L. Thorndike, "Educational Psychology," pp. 80–93.
[2] Chapters XIII and XIV.
[3] Chapter XIII.

"spread" of special training to the fact that many lines of activity differing in several characteristics may yet have some characteristics in common; while Bagley proves by argument and experiment and appeal to experience that there is no such thing as a generalized habit; that all habits are specific. He asserts, however, that we can develop through specific exercise in a single department of thought both in ourselves and in our students *ideals* of industry, neatness, accuracy, cogency, and the like, which may easily extend to other departments of thought, thus furnishing to this extent a formal training.

The position of the present writer is that most if not all the effects hitherto ascribed to formal discipline are better explained by a careful analysis of relative educational values as based upon the content of the studies themselves.

DISCUSSION: — Debatable points in the doctrine of formal discipline.

3. Reliable Tests of Educational Values

22. If the doctrine of formal discipline is inadequate to explain the unquestioned educational results that spring from a seemingly narrow curriculum, like that of language and mathematics, to what then shall we ascribe these results? How, in other words, shall we test the educational worth of any given body of subject-matter? The answer to this question is already implied in the rejection

of the doctrine of formal discipline, for if the fact be established that all training cleaves to the content in which it originates, it follows immediately that in an analysis of content we shall find the worth of a subject, not only for practical life, but also for mental training. The doctrine of formal discipline must give way, therefore, to the doctrine of concrete specific discipline. If, then, we grant the superior character of the training in language and mathematics, we shall be obliged to assume a depth, breadth, and universality of content for these subjects such as the classicists themselves in their zeal for an easy but unsound explanation have not always claimed. That these subjects have this universality and richness of content subsequent sections will attempt to show.

Subsidiary claims to superiority based on temporary conditions, such as the ease with which a subject can be taught, or the superior quality of teaching that may at any time be manifest, have no lasting validity, for if a subject is hard to teach so as to secure good educational results, all we have to do is to learn to teach it properly. Natural science in the universities offers a brilliant illustration of how a subject can produce its legitimate mental and practical results when the spirit and technique of its teaching are developed and generally applied. So long as science was taught according to literary methods its educational inferiority was manifest; but when men discovered methods in harmony with its content and aims,

then it took full rank alongside the older disciplines. Teachers are still striving to perfect their methods of teaching other new subjects, such as history, modern foreign languages and the mother tongue. The success that science has attained in the last forty years points to the possibility of an equal success in the new fields.

DISCUSSION: — Comparative validity of the doctrine of *specific* as opposed to *formal* discipline.

23. An unqualified answer to the question, "What knowledge is of most worth?" can hardly furnish a satisfactory course of study; for we must at once ask, to whom? for what purpose? under what conditions? Herbert Spencer, shortly after the middle of the nineteenth century, asked the question in his well-known book, "Education," and gave the unqualified answer, "Science is of most worth." However great the influence of this book may have been, nobody has ever been able to construct a successful course of study in accordance with the answer given. As a special plea for a department of knowledge then coming into a highly developed state, but largely neglected by the school, Spencer's contribution was most important, even epoch-making; but as an all-round guide to the selection of subject-matter for schools it could not in the nature of the case be satisfactory; for, on the one side it neglected or undervalued the institutional side of modern life,

while on the other it failed to distinguish sufficiently between the individual and the professional need of science. We need, for instance, good sanitation in our houses, but all men need not be plumbers; we need clean antiseptic treatment of wounds, but all men need not be surgeons; there is likewise professional and popular need of chemistry, physics, biology, astronomy, etc. Much of Herbert Spencer's plea for science pertains only to professional needs, and has, therefore, small application to the high-school curriculum.

DISCUSSION: — Grounds for Spencer's criticism that literary education is merely for adornment.

24. As in the past, so in the present, not a little confusion in the selection of studies arises from the attempt to compass in a single aim all the purposes of education. Modern education at least has aims, not aim. Even such elevated words as *character, virtue, highest good, citizenship, holiness* are at present inadequate guides for the making of the curriculum, for, on the one hand, they relegate to purely subsidiary rank many subjects of practical and educational value whose functions cannot be properly performed by more favored studies; and, on the other, they ignore or undervalue personal capacities and needs. The man who says *culture* is the end of secondary education will overvalue literary insight and undervalue practical efficiency; he who puts most

stress on intellectual acumen will have small patience with æsthetics; the advocate of specific utility will think more of special than of general education; the Herbartian who lays all stress upon "the development of moral character" transforms such subjects as mathematics, science, and accessories like physical and manual training into mere tails to the literary and biblical kite. It is the fate of all one-sided conceptions of the purposes of education, first to reject all aims not immediately pertaining to the final one, and then either to have a narrow fixed curriculum, or to admit into the curriculum subjects for whose presence the single aim gives no just warrant. Witness a judgment arising from the ethical aim of the middle ages: "Many learn for the sake of knowing, that is pitiful curiosity; others learn that they may be known, these are subject to the jibe of the satirist — your knowing is naught when no one else knows that you know it — that is idle vanity; others learn to earn money and station, that is contemptible commercialism; one learns in order to edify, and another to be edified, that is wisdom. Only the last two make no misuse of knowledge, for they seek learning in order to act rightly." [1]

DISCUSSION: — Modern attempts to formulate a single aim for education: "Complete living," "Character," etc. See Bagley, "The Educative Process," pp. 40–65.

[1] Willman, "Didaktik," Vol. I, p. 286.

25. Gathering up the conclusions that follow from the foregoing facts and arguments, we find that reliable tests of educational values must consider the following presuppositions: —

(1) *A Hierarchy of Aims*

Study of the physical, mental, and social evolution of men shows that what we are disposed to regard as the lower aims of life are not mean, but only elementary. They have had and still have their part to play in the struggle for existence, and are only to be regarded as primitive because it is now so easy to supply these first requisites for survival. Let the water or food supply begin to fail in a community, or the fuel give out in winter, or the means of shelter be destroyed in a night, and we shall see how imperative these so-called "mean" motives of life will immediately become. Professor James[1] has described the hierarchy of *mes* belonging to every human being, in each of which he must dwell and if possible develop. There is the physical *me*, with its hereditary tendencies and results, which lies at the basis of my success and well-being in life, and out of which I must make as much as possible. Then there is the economic *me*, the intellectual *me*, the social *me*, the spiritual *me*, each of which is subject to atrophy, or degeneration, on the one hand, but on the other, easily capable of normal growth and

[1] William James, "Psychology," Vol. I, pp. 291–296.

refinement. The subject-matter of a well-selected curriculum will stimulate each of these potentialities of youth and provide nourishment for its healthy development. The maker of the course of study will not only recognize the presence of all these phases of existence, but will also provide for their simultaneous and adequate unfolding.

(2) *A Richness and Abundance of Material*

In the past, singleness of aim has been accompanied by relative poverty of material. The early Greeks had only their native literature, to which were added later geometry and philosophy. The schoolmen had for their advanced schools only the philosophy of the Greeks, and then confined themselves mostly to the dialectics. The early humanists wanted nothing more than the classic literature of Rome, to which that of Greece was afterward added. Indeed one may say that until the nineteenth century, there was but little valuable material available outside of philosophy, classic literature, and elementary mathematics. But, as if answering to the modern need for educational development in every aspect of life, we find a corresponding richness of subject-matter. Even the old disciplines have been perfected and extended as instruments of education, while a host of new subjects present themselves. One has but to think of modern philology and mathematics, of history, economics, and modern foreign languages, and above all of modern

natural science, to see how enormously the old curriculum has been extended and enriched. The formalist might regard this expansion of knowledge as of no educational significance, since his doctrine of formal discipline makes abundance and variety of material superfluous; but when in accordance with modern experiment and psychological analysis we accept the doctrine of specific discipline, then we see the necessity of a content as rich and varied as are the needs of men in modern life.

(3) *The Claim of all Classes of Society to Participation in Secondary Education*

Had not modern studies brought about a recognition of the hierarchy of *mes*, and with this the hierarchy of *aims* in education, and had not development of knowledge arisen from its internal forces, the coming of democracy even would have made both necessary. As the historian well knows, past singleness of aim and poverty of material have always been accompanied by narrowness of range in the social standing of those to be educated, whether it be the landed aristocrat or noble, the priest, the dialectician, or the classical scholar. Modern democracy, however, is satisfied with nothing less than the opportunity for universal education, not only in the primary school, but also in the high school and university. Whoever, therefore, seeks to confine education to a single aim, or a single class of society, or to a narrow curriculum

adapted perhaps to such aim and class, can hardly be a successful architect for the high school of modern democracy. But this extension of the benefits of education to all classes of the community brings with it the need of placing emphasis upon new aspects of capacity, interest, and destiny in the individual, and consequently the need of greatly extending and enriching subject-matter.

(4) *The Limited Amount of Time and Strength of the Student*

In European countries, especially in Germany, the desire to make secondary education not only thorough but broad has led to excessive demands upon physical and intellectual strength. The number of gymnasial students with defective eyesight,[1] for example, is well-nigh appalling, to say nothing of other impairments of body and mind. It is necessary, therefore, for the modern schoolman to devise means whereby we may duly recognize the limits of time and strength, while providing for the legitimate demands of a democratic system in the midst of superabundant material.

The following chapters will endeavor (*a*) to group the various branches of study into departments according to the nature of the content; (*b*) to inquire particularly as to the specific educational functions of each department, as indicated by the nature of the content itself; and

[1] See H. Cohn, "Hygiene of the Eye," Ch. VIII, pp. 63–69; also p. 77.

(*c*) to forecast the principles according to which a curriculum for a given purpose can be constructed.

DISCUSSION: — 1. Effects of modern evolutionary theory in determining the aims of education. 2. Twofold influence of democracy and the development of systems of knowledge in bringing about variety in schools and discipline.

CHAPTER II

THE CLASSIFICATION OF STUDIES INTO SIGNIFICANT GROUPS

26. Attempts have been made by such men as Comte, Spencer, and Bain to arrange departments of knowledge into a hierarchy of subjects beginning with the most elementary and closing with the most comprehensive. Thus Comte places biology at the bottom and sociology at the top. Yet so numerous and intricate are the interrelations of the sciences, both natural and human, that each thinker finds it easy to criticise the arrangement of his predecessor, but hard to propose one not subject to like criticism. Life, for example, which is studied in biology, presupposes physical and chemical forces and an abiding place in which to develop. If, therefore, we follow the course of evolution, why should not the antecedent conditions be placed first? If in our search for that which is most fundamental we go back to final causes, we shall become involved in the intricacies of speculation, and perhaps decide with Anaxagoras [1] that in the beginning there were two factors, a chaos of matter interpenetrated with *nous*, or forming mind, when we may take our

[1] See any history of Greek Philosophy.

choice as to which to place first, the awaiting material or the forming force. Neither could effect anything without the other.

Arrangement of the branches of knowledge in a hierarchy being impracticable, we are at liberty to arrange them according to convenience of treatment. One might follow the order of their importance in education, but here differences of opinion would arise. Of one thing we may be fairly sure; namely, that knowledge has been gradually differentiated and broken up into specific subjects from convenience in treatment, and we are at liberty to assume that each subject, as geometry, physics, physiology, history, etc., embodies a specific content that differs so essentially from that of every other subject that no two can be so successfully studied or developed together as they can be apart. It would appear, therefore, that since content is not only the source of educational value, but is also the ground of any natural and convenient classification, we may accept the subjects of study as we find them, and proceed to group them in any way not inconsistent with their fundamental nature.

DISCUSSION: — Historical attempts at a logical classification of knowledge. See Bain, "Logic: Deduction," pp. 229–236.

27. The broadest and most obvious distinction in the content of subject-matter of knowledge is that between (1) the facts and laws of physical nature, which, though

observed and formulated by the mind, are not dependent upon the mind for their existence or validity, and (2) the linguistic, literary, artistic, and institutional constructions that have their genesis in the thoughts, feelings, and volitions of human kind. The first group pertains to nature, the second to man; the first might be called the sciences (including of course mathematics), the second the humanities. Both have from the earliest times been in varying degrees the subject-matter of education.

So intimate and so important, however, have the interactions between the purely natural and the purely human become that a convenient threefold grouping may be proposed, as follows: —

1. Natural Sciences (including mathematics), or those that pertain solely to nature.
2. Humanities, or those that pertain primarily to things purely human, such as language, æsthetics, politics, ethics, religion, etc.
3. Economic Sciences, or those in which the laws of nature are applied by human volition to produce the conditions for the well-being of individuals, the multiplication of populations, and the further development both of natural sciences and all that pertains to man as such. To this group we may assign not only economics proper, but many technical branches arising from applied science.

1. The Natural Sciences

28. The physical world may be regarded (1) as relatively stable, yet under the constant influence, outwardly of mechanical, and inwardly of chemical, forces. Mechanical forces hold the whirling worlds in their grasp, effect the movement of winds and waters, the falling of bodies, the phenomena of light, heat, and electricity. Chemical forces are those that effect changes or secure equilibrium among the minute molecules that make up the composition of bodies. The physical world may, on the other hand, be regarded (2) as in a state of growth, development, or evolution. Everything, even the sun, the stars, the planets, the nebulæ in the heavens, the world itself and all the plants and animals upon it, are now conceived as being still in a state of evolution, or at least as having reached their present stage through long ages of development.

It has long been the custom to group together those sciences in which mechanical and chemical forces are predominant as the *exact sciences*, since the laws that govern the domain of mechanics and chemics are in general capable of such demonstration as to leave no doubt concerning their truth and universal validity. Many of these laws involve quantitative measurements, and as such are seen to be mathematical. Mathematics is therefore rightly classed with this group; for however independently and abstractly its truths may be investigated, yet they

always find their application in the quantitative aspects of the physical world.

A second group of natural sciences arises from the genetic aspect of the world; namely, those that pertain to life, or living things like plants and animals. These are the biological sciences, zoölogy, botany, physiology, embryology, etc.

A third group, consisting of what are called the *earth sciences* (physical geography, geology, etc.), arises from the mixed and complicated nature of its elements, for the earth has been and still is subject to mechanical evolutionary forces; it shows the results of past and present evolution in the nature of life; while many of its most striking phenomena (earthquakes, volcanoes, hot springs, etc.), are due to mechanical and chemical forces. According to this analysis the natural sciences of interest to the high school may be conveniently grouped as follows:

Group I. The exact sciences: mathematics, physics, chemistry, astronomy.

Group II. The biological sciences: zoölogy, botany, physiology (embryology, bacteriology, etc.).

Group III. The earth sciences: physical geography, geology.

2. The Humanities

29. The sciences which owe their genesis and development to the mental and spiritual needs of individuals and

societies are numerous and important. Among them we find first of all, language, with its manifold departments; then history and art; then jurisprudence, political science, theology, psychology, logic, philosophy, sociology. All of these, though having more or less intimate relations to the material world, as everything mundane must have, are yet primarily the outgrowths of the psychic and social nature of men. Throughout the whole history of civilization they have furnished the chief materials of culture; it is upon their substance that the minds of men have been nourished; out of their treasures of knowledge the curriculums of the past have been constructed; in them the educational interests and hopes of mankind have centred.

In language we have to distinguish between the content itself, as embodied in literature, and the technique of speech, as seen in grammar, rhetoric, etc. The moment we begin to analyze the content of literature, however, we perceive that the æsthetic and the ethical are so deeply embedded in it and so inextricably interlaced that it is impracticable to try to separate them for purposes of curriculum making. Like the two blades of the shears, they may be distinguished, but should not be sundered. In like manner, it is only for purposes of estimating educational worth and determining relative emphasis in instruction that we may be permitted to separate the technique of speech, *i.e.*, the grammar, rhetoric, etc.,

from its substance, *i.e.*, the literature. Logically they may be separated, but didactically they belong together.

Excluding those sciences whose province lies beyond the high-school period, we find history and the fine arts as the remaining subjects of this grand department of knowledge.

The natural sciences have fallen into three convenient groups. Continuing the enumeration of groups by taking up the humanities, we have the following result:—

Group IV. Languages.
1. Literature (content, æsthetic and ethical) of ancient and modern languages, including the mother tongue.
2. Linguistics, including grammar and rhetoric.

Group V. Pure Æsthetics (the remaining fine arts), music, drawing, painting, sculpture, architecture, etc.

Group VI. History, including civics.

3. Economic Science

30. The scientific study of economics as an application of other sciences both natural and human began with the appearance of Adam Smith's "Wealth of Nations" in 1781. This new department of knowledge, practically only a hundred and twenty-five years old, has won for

itself an enviable position in the universities of Europe and America as an essential part of a rational curriculum of study. It has, moreover, so many aspects applicable to secondary education that its classification in a separate group is advisable for purposes of clear analysis, even if it should not be thought to arise from logical necessity.

In many high schools it is customary to enumerate elementary economics among the subjects of study, and thus to make it a component part of the curriculum. In other secondary schools economics furnishes rather a point of view for history, geography, and technical aspects of manual and commercial training. It becomes, therefore, not so much an applied science as a practical study arising from the blending of the science of man with that of nature. This gives us our third grand division and our final group: —

Group VII. Economics, including also commercial geography, and the technical aspects of commercial and manual training.

31. Gathering the results of our classification together, we have the following schematic arrangement: —

A. Natural Sciences

Group I. The exact sciences, mathematics, physics, chemistry, astronomy.

Group II. The biological sciences, physiology, zoölogy, botany (bacteriology, embryology, etc.).

Group III. The earth sciences, physical and mathematical geography, geology.

B. Humanities — The Sciences of Man

Group IV. Language.

1. Literature (æsthetical and ethical content) of ancient and modern languages, including the mother tongue.
2. Linguistics, grammar, rhetoric.

Group V. Pure Æsthetics (the remaining fine arts), music, drawing, painting, moulding, designing, etc.

Group VI. History, ancient, mediæval, and modern.

C. Economic Science

Group VII. Economics (union of science of man with that of nature), economics proper, commercial geography, technical aspects of commercial and manual training.

DISCUSSION: — 1. Validity of the foregoing bases of educational classification of subject-matter; 2. other classifications that have been made; 3. that might be made.

CHAPTER III

FUNCTION AND RELATIVE EDUCATIONAL WORTH OF THE STUDIES AND STUDY GROUPS

1. Fundamental Distinctions between the Natural Sciences and the Humanities

32. Before entering upon a detailed analysis of the content and worth of the respective studies the student will do well to keep in mind the broad, fundamental educational distinctions between these two grand divisions of knowledge, for only by so doing can he avoid the confusion incident to the treatment of details so numerous and interrelated. These distinctions fall naturally into three groups; namely, those that relate (1) to truth, (2) to beauty, (3) to goodness.

33. In examining the character of the verities (that is, the facts, conceptions, and laws) contained in the two grand divisions, the first obvious difference that comes to view is that between causes and effects which are uninfluenced by human attributes as in physics, chemistry, and biology, and those, on the other hand, in which subjective or psychological forces have had a part, as in language, history, and fine arts. The human is variable; natural law invariable. Whether we study the mechanical

or the biological causes and effects of natural science, we concern ourselves only with efficient and unvarying causes, and the effects that necessarily follow from them without exception. Significant facts may be hard to separate and determine, conceptions may take centuries to form, and the knowledge of laws may be greatly delayed (witness the efforts of scientists to discover the causes of dew), but once the facts have been clearly learned, the conceptions adequately formed and the laws demonstrated, then are there no exceptions, there is no room for uncertain intuitive apprehension. Natural laws must be accepted as valid and invariable, whether in the realm of mechanics or in that of physical life. Furthermore the laws of the physical world rise to the highest generalizations, like those that pertain to gravitation, the indestructibility of matter, the persistence and transmutability of force, and the correlation of forces.

The result of so considering nature has been to place its forces in the service of men, to free their minds of a crushing weight of superstition arising from ignorance of its laws, and to reveal to them the physical conditions of healthful living. The mental effect of the study of natural law is to awaken and nourish enthusiasm for the true as such, to discard authority, and to trust only vigor of reasoning in searching for natural laws, and to believe in their unassailable validity when once discovered and adequately tested. These are valuable results, for great has

been the weight of woe suffered by mankind because their coming has been so long delayed. Let us call to witness the baseless terrors arising from erroneous belief regarding natural causes, the needless famines, diseases, and devastating pestilences that have afflicted mankind, and then the more lamentable perversion of noble human qualities themselves through blind adherence to authority, or by the injection into human affairs of the devils generated by ignorance of natural law, as in witchcraft or in the Spanish inquisition, thus poisoning the mind with the ptomaines of its own diseased thinking. Modern natural science has moreover diminished pessimism in the world, in that on the one hand the doctrine of evolution has given hope to those who had it not, since it shows how the world of man as well as that of physical nature has risen and will still rise in the scale of being through the growth engendered by inward force and outward circumstance; while on the other it furnishes an ever growing expansion of the material necessities for higher standards of life for even greater populations. The educational importance both to the individual and to society of forming such a view of the world and of mastering the means for its realization can hardly be overestimated. Once men thought the only fountain of youth and hope springs from the art and literature of the Greeks, now they know that there is another no less quickening that flows from the science of the moderns.

34. Turning now to an examination of causes and effects in the humanities, we find an element of uncertainty, of contingency, due to the admixture of a subjective element. Buckle in his "History of Civilization" failed to prove his thesis, that historical effects spring alone from physical causes, and that consequently history is only a branch of natural science. He helped, however, to correct the equally one-sided view of Hegel in his "Philosophy of History," that historical effects are purely subjective, though hardly capricious, since they spring from the inner nature of man. If history is not natural science, neither is it psychology.

How, asks Helmholtz,[1] in his lecture on the relation of the natural sciences to the whole of science, will an ambitious man act? Can we predict with the certainty of natural law? Is there not room for caprice, for free volition, for varying mood? Are not the laws of ambition, if there be such, subject to exceptions that cannot with certainty be foretold?

Even where there are laws of human action that approach in certainty to those of physical nature, their discovery is of such extraordinary difficulty, that there is always room for the introduction of surmise and authority. When we find it difficult to establish a law, we are disposed to trust the man who says he knows what it is. Of this at least we may be sure; namely, that nowhere in human

[1] "Populäre Vorträge," Vol. I.

affairs do we find the reign of mathematical law as in physics; no proposition in literature, art, or history, however true it may chance to be, appeals to us with the certainty that attaches to a law of algebra or geometry when once it is understood. Generalizations in literature, art, and history are attained by a species of reasoning that Helmholtz calls *artistic induction*, and are frequently favored by many a happy, lightning-like inspiration, or lucky insight. This is often found in history and literature, and is essential in all true art. "It is an essential part of artistic talent to be able to reflect the outer characteristics of a subject through word, form, and color, and to conceive by a kind of instinctive apprehension how the mental status must develop, without being guided therein by any fixed rule. On the contrary, when we notice that an artist has consciously worked according to fixed laws and abstractions, we pronounce his work poor and trivial and our admiration is at an end. The natural sciences are able to express their inductions in sharply defined rules and laws, whereas the sciences that deal with man have for the most part to do with reasoning that is guided by a psychological feeling of tact." [1]

It is in the department of grammar that we approach nearest to the strict logical reasoning of natural science. There is a substratum of logical nature in subject, verb, and attribute, and in their respective modifiers and con-

[1] Helmholtz, "Vorträge," I, pp. 15–16.

nectives. But the concrete grammar of any tongue has to do with the language as it has developed without any conscious logical direction. Speech is therefore full of idioms that refuse to be parsed, while practically all rules of syntax are violated by numerous exceptions.

This introduction of psychic forces in the shaping of the life of man has, however, great educational advantages. Evolution, for example, is no longer animal in character, wherein every individual is the enemy of every other as soon as there is competition for the means of survival; but it is human and hence coöperative. It admits of benevolence and mutual helpfulness; it enables men to set the forces of nature to work to feed, clothe, shelter, educate, comfort, inspire, and protect all; it impels them to form themselves into groups, large and small, permanent and temporary, that they may secure in institutional form every advance made by individual or community.

Furthermore, the nature of the humanities impels men to pass beyond efficient or practical causes, and to search for final or ultimate causes. They try to discover not only mechanical causes and effects, but also the ends which mechanical causes serve. In other words, the humanities show not only what must be, but also what ought to be. They define the laws that should govern conduct; they nourish alike the rational and the spiritual powers of men; they help explain and perfect institutions, thereby increasing social happiness and well-being, and

equipping the youth with a wholly human and beneficent view of the world.

Yet, notwithstanding this striking difference between the natural sciences and the humanities in their attitude toward final causes, it would be an error to overlook the fact that in the biological sciences especially the conception of natural forces working to an end, which if unconscious and non-moral, is still teleological in the sense of a final cause, forms a working basis for many modern men of science. To be sure, no real scientist can accept the old notions of external teleology, in which the observer thought he saw in organisms as now adjusted an evidence of divine architecture which according to a preconceived plan fitted each organ for its perfect work, and possibly the whole creature for the needs of men. This view must now be rejected, since the scientist knows that organs have become what they are through development, through long ages of adaptation to ever changing environments; and he is convinced, moreover, that this generally upward striving in the battle for existence has necessarily been for the sake of the animal itself, and not for the sake of some other creature, say man, who would like to devour it, or use it for purposes of his own.

The rejection of this external teleology, however, does not exclude the possibility of one more rational, deeplying, and inherent to the nature of the living thing itself. Everywhere we see plants and animals transforming the

raw material of nature found in earth and air and shaping it into new forms in accordance with some indwelling force, ideal, or plan.[1] Plant an acorn anywhere in the world, and it will strive to become an oak tree, noble and generous where the conditions are favorable to its growth, and dwarfed where they are unfavorable, — but in essential plan an oak tree always. Here then in this conception of nature we have a link that unites mechanical and final causes, and an easy transition from the unconscious aim-accordant forces of nature to the conscious moral aims of human kind. The student of the history of philosophy does not need to be told how vital this *Zweckbegriff* was to the thinking of the ancients. A paragraph from Willman's "Didaktik" sets the whole matter in a clear light: "The inner nerve which unites the moral and the natural sciences is the *Zweckbegriff* (*i.e.*, the notion of inner forces working according to imminent purposes). This nerve modern research has — let us not say severed, but greatly neglected and permitted to lose in guiding power. The idea of end or aim was a metaphysical principle with ancient idealism, the good being considered as the final cause, not only of effort, but also of that which occurred; with this view, thought was antecedent to the material world, reason came before nature, the complete before the incomplete, freedom before necessity. Francis Bacon attacked this view and, with a brilliant turn, compared

[1] See Baldwin's article, "Teleology," in "Johnson's Cyclopedia."

final causes to vestal virgins — worthy of reverence, but unfruitful. Modern research has adopted this view, and has made the mechanical displace the older organic conception of nature. By so doing it has achieved extraordinary results in the individual sciences, but it has at the same time isolated itself from the moral sciences and made itself a stranger to an ideal conception of things. Partial truth, however fruitful, comes to this: — practical applicability at the expense of the whole truth is too dearly bought: vestal virgins, though unfruitful, were still not useless; they preserved the sacred fire and their virtue dignified and consecrated their whole sex."

DISCUSSION: — Old and new conceptions of *teleology* and their present validity.

35. What æsthetic differences are there between these two departments of knowledge? It is true in a sense that natural science has nothing whatever to do with æsthetics, for its purpose is to discover or interpret fact, to establish laws, and to trace their effects. Yet we know that it is difficult for an astronomer not to be a poet, so powerfully do the beauty and majesty of the heavens impress him; there is a species of beauty in mathematical demonstrations, and indeed one may say an æsthetic quality both in physical law and in the adjustment of form to function everywhere seen in life whenever we contemplate them from the standpoint of their ideal value. But when all

legitimate claims have been allowed, it must be evident that æsthetics in natural science is so much a subordinate consideration that with many men of science it may be entirely dissociated from their scientific investigations. Much of our sense of the beautiful is indeed associated with things of nature, such as flowers, birds, human forms, falling rivers, and flaming volcanoes, but the æsthetic appreciation directly awakened by contemplation of nature is not a part of science.

Those departments of the humanities, however, that belong to what we call art, such as poetry, music, drawing, painting, design, etc., are distinctly æsthetic, for art has not only a sense medium, as seen in word, form, tone, color, and material, but it has also an elevating indwelling ideal, now showing the perfect balance of spirit and body, as in Greek statuary, now the volitions or impulses of mankind. Art reveals to man both the beauties of nature and the treasures of the human spirit; it is inspired not alone by the cold glory of the snowflake, but also by the glowing feelings or the inspiring conceptions of moral and spiritual beings. It is consequently both the source and the expression of the highest human æsthetic attributes.

We must not conclude, however, that because these differences between natural sciences and the art division of the humanities exist, we ought therefore choose the one and reject the other; for difference of kind is only difference, not the mark of inferiority or superiority.

DISCUSSION:—1. Compare the æsthetics of mathematics with that of literature; 2. that of astronomy with that of sculpture.

36. Finally, how do the humanities compare with the natural sciences in the domain which we call the good? Here we must first distinguish between subjects which by analogy may merely suggest goodness, and those which directly reveal it, since they have to do with the motives and volitions of men. The natural sciences belong to the first class, for the will of man has no part in the causes and effects of the physical world. Study of these forces, however, may elevate the mind and in a way point to a power that transcends them.

Yet when we carefully examine the content of natural science, we find, not good in the moral sense, but only necessity, the inevitable results of irrevocable law. In the world of life we have biological development, which favors the strong, but crushes the weak. It is the struggle for existence, the survival of the fittest, the upward progress of the whole through plant and animal evolution that knows no moral motive, no good-will, no mutual helpfulness in the human sense of the term.

In itself alone, a recognition of the unchanging laws of nature simply helps to make men prudent. The case is quite different when we come to literature, art, and history. These have to do with the ideals and conduct of men, and have the power, therefore, of revealing motive and volition. In this sense these subjects have a

content that the natural sciences lack. As above explained, they displace animal by human evolution in conscious effort, in which coöperation and mutual helpfulness take the place of a deadly unconscious struggle for existence. In these subjects we have a revelation positive or negative of good-will, benevolence, sympathy, love. Through them we learn the true form of institutional life as seen in group coöperation. Evil is here recognized as degeneration and departure from the forms of social well-being. Through the humanities we get our moral view of the world, our attitude toward our fellows; from them we draw our ideals and impulses for social life.

If then the natural sciences make men prudent, the humanities give them moral insight, ideals, and inspirations.

DISCUSSION: — 1. Basis for the claim that the sciences stand on a par with the humanities in their influence upon the development of character. 2. What differences are discernible?

2. Detailed Study of Educational Values

We may now pass from this general inquiry to a special investigation of the educational function of the various study groups, and, as far as practicable, of the separate subjects within the groups. This function, as already indicated, can be adequately determined only by an analysis of content; not by any vague theory of a mystical definable somewhat' that may be conceived as emanating from them.

A. The Natural Sciences

Group I. The Exact Sciences

(1) *Mathematics*

37. When we speak of mathematics in the high school we mean primarily algebra, geometry, and plane trigonometry. What important specific contributions are these subjects calculated to furnish in the education of youth? Why, even in the days of antiquity, was mathematics so highly esteemed as a discipline for the young? The reason is not far to seek, for the world is so constituted that it cannot be apprehended without some means for discovering and measuring its quantitative relations. In the early days of reflection, when men began to search for bottom principles in the constitution of things, it was inevitable that they should come to the ideas of number and form as necessary to the very existence of the world, for whatever fills space and time must be subject to geometrical and numerical laws; hence the saying of the Pythagoreans: "What is the wisest? *Number.* And what next? *Man*, who gave names to things." Mathematics and language, then, are the two fundamentals in the world, and presumably also in education.

But what, we must ask, is the educational function of this quantitative study? In what does its peculiar essence consist? Aristotle[1] himself asked why a youth

[1] "Ethics," Ch. VI, p. 9.

may become a mathematician, but hardly a scientist, and gave this reason: Mathematics rests upon insight into principles which appeal to the mind as unconditionally and necessarily valid as soon as they are understood; but science presupposes experience also, *i.e.*, observation, experiment, hypothesis, verification, theory. The possibility of progressive insight into mathematical truths comes early, but ripened experience and the possibility of constructing a science from it come late.

From this unconditional and necessary validity of mathematics there arise a number of advantages not found in equal degree in any other subject.

Here in the first place is knowledge of whose certitude there can be no question, which is not subject to the caprice, opinion, or volition of men. Here there is no authority but that of the truth itself. Certainly in the realm of mathematics the favorite aphorism of Lucretia Mott holds with unquestioned force, "Truth for authority; not authority for truth." Mathematics has to do, not with memorized and transmitted traditions, or with superstitions and beliefs hoary with age, it may be, but with a system of demonstrable propositions developing from a few self-evident truths that appeal to the understanding with a directness and convincing certainty found nowhere else.

DISCUSSION: — Is training in an exact science the best preparation for the pursuit of an inexact one?

38. Next after certitude in educational importance we may perhaps reckon the progressive nature of algebra and geometry, indeed of mathematics as a whole. Starting from the most elementary stages of mathematical insight, each of these subjects, the one in the realm of time, the other in that of space, proceeds in unbroken order to ever higher generalizations, which assume manifold relations to each other, and which in turn lay the foundations for still further advancement. There is consequently a never ending series of definitions, principles, combinations, and demonstrations that reward the mind for its past efforts and stimulate it to ever renewed exertions. The following quotation from Bernhardi shows in vivid manner the progressive character of the science: "Mathematics as a system consists of sharply defined members, which, however, have the most intimate connection; these members rise in an ascending series, and in their upward progress give rise to more and more intricate and difficult combinations, like concentric rings starting from one and the same central point; yet with this difference, the individual members appeal to the same qualities of mind, and each proposition is a whole in itself, yet also a representative of the entire science. This construction of mathematics makes each member a separate end for effort and gives the mind, when once this end has been reached, the feeling of accomplishment, and yet at the same time because of the strict connection of parts, one of longing,

the wish to advance. The conditions of progress are most easily secured by following this progressive, upward movement, and the mental powers gain in breadth by progress through the homogeneous parts of the science, being at the same time stimulated to greater depth."[1]

39. Mathematics has been highly esteemed as a propædeutic for other subjects, for whatever needs to be measured or quantitatively determined must rely upon the respective departments of this science. It not unfrequently happens that some phase of mathematics is overvalued, thus leading to sterility of result in the department concerned or to indifference on the part of the learner. The most noted instance of this overvaluation relates to the function of mathematics as an exercise in formal logic. In discussing mathematics and physics in secondary education, Schellbach remarks: "Among the educated classes we meet everywhere the error that mathematics is chiefly useful in education as applied logic, even if it is limited to a minimum of content. This error finds its explanation in a number of circumstances, of which two are of especial importance; first, in the common ignorance of the manifoldness of mental processes, methods, and ideas involved in secondary mathematics, and, second, in the erroneous conception of the notion of formal discipline, which does not perceive that form and content are inseparably united." In this connection

[1] Compare Willmann, "Didaktik," Vol. II, pp. 132–133.

Frederick Meyer says, "Were the mere logical side of this subject sharply and repeatedly brought to the front, it is probable that the interest of bright minds in mathematics would soon be extinguished." Yet, it would be unwisdom to overlook the influence that the logical vigor, say of geometry, has upon the plastic mind of youth. Thus, it is related of Abraham Lincoln when as a young man he first read the plane geometry of Euclid that he exclaimed, "Now I know what an argument is; now I understand when a proposition is proved."

It is when we examine the relation of mathematics to science, both pure and applied, that we see most forcibly its indispensability as a propædeutic. Astronomy was once studied almost exclusively as a mathematical science, as in the days of Copernicus, Kepler, and Newton, and still has its mathematical side. So dependent is any precise and advanced study of physics upon mathematics that it is to be reckoned at once as a mathematical science, though, as will be seen later, physics has important aspects of educational worth not found in mathematics. With chemistry the dependence upon mathematics is much less, though here we have the laws of constant relations, multiple proportions, chemical formulas and equations. In history we have chronology; in sociology, statistics; in æsthetics, laws of proportion and of sound; and in psychophysics, quantitative measurements of stimulus and response. High-school algebra and geometry and

trigonometry supply in large measure the quantitative laws which are applied in architecture, sculpture, engineering, military science, and navigation. It is through well-selected problems for solution that the student is made fully conscious of the intimate dependence of many pure and applied sciences upon the mathematics even of the high school; and this consciousness of practical worth often outweighs with the youth all the mental values of which he may hear, but of which he has no adequate conception.

DISCUSSION: — If the value of mathematics as applied logic is small, and the student is to pursue none of the sciences mentioned, what is the educational justification of requiring him to master algebra, geometry, and trigonometry? See § 40–42.

40. It is highly desirable that teachers and parents, especially, should have a clear apprehension of the mental traits that are specifically cultivated by a study of mathematics. From the foregoing analysis of content we can easily comprehend that this subject is preëminent in its power to train the mind in form and number to exact and progressive thinking, to adequacy of conception and precision of expression, to energy of attention, to clearness of inner vision, to perception of necessary truths, and to the habit of seeking in its proper realm, not the conjectural, but the certain, for there is no "of course" in mathematics, since even the self-evident must be proved. If in behalf

of language Hegel could say, "He who knows not the Ancients has lived without knowing what beauty is," so Schellbach can reply, "He who has not known mathematics and its results in natural science has died without knowing what truth is." [1] Mathematics, moreover, helps to quicken the scientific conscience by making the student unsatisfied with inaccurate and inadequate knowledge, and with expression that lacks precision or apprehension that does not arrive at full comprehension. It thus becomes a school of scientific thinking, terminology, and expression.

DISCUSSION: — To what extent is the confidence begotten by successful study of mathematics useful in non-mathematical departments of life?

41. Another mental aspect of the educational value of mathematics is the training it gives in the constructive imagination, for there is everywhere in mathematics a demand for the exercise of free creative power, whether in the solution of problems, in geometrical constructions, in the formation of equations, or the discovery of principles and proofs. "The feeling of elation that accompanies this creative activity produces the future mathematician." Jacob Steiner can exclaim, "We too are poets!" and Emil Lampe in his speech at the celebration of the Kaiser's birthday at Berlin in 1893 says, "In the development of new theories the mathematician needs as keen a creative

[1] Baumeister, "Handbuch," Vol. IV, p. 21.

imagination as does the creative artist." Notwithstanding the truth that underlies these claims, it would be the height of educational unwisdom to confound the mathematical with the poetic exercise of the imagination, and to conclude that the one is the equivalent of the other; for, though both may be designated "imagination," they are as far apart as are the thoughts from which they spring and to which they cleave. The one is illuminated by the electric light of insight, the other is made to glow with the heat of feeling.

42. Mathematics stands first among the subjects of the high-school curriculum in the magnitude of its demand upon the 'logical,' or 'rational,' and the smallness of its demand upon the 'mechanical' memory. This again arises from the nature of its contents. Without insight no mechanical memorizing is valuable in this department of knowledge, and with it little is necessary. Every teacher of geometry, for instance, knows that the student is lost who tries to make good his lack of insight into the logical steps of a demonstration by his diligence in memorizing the demonstration as it stands in the book.

43. The foregoing sketch gives an outline of the educational worth of mathematics as based upon the nature of its contents, but an exposition of its limitations which are as striking as its advantages, and its comparative value can be undertaken only in connection with the subjects still to be discussed.

DISCUSSION: — Importance in the education (*a*) of boys, (*b*) of girls, of the following elements in mathematics: 1. certitude; 2. progress in complexity and abstractness; 3. propædeutic for pure and applied science; 4. training in imagination and memory.

2) *Physics*

44. Physics as a subject for high-school instruction has a double advantage, in that it is both mathematical and experimental. In so far as it is mathematical, it furnishes a concrete field for the application of the generalizations of algebra and geometry, and consequently shares with these subjects their apodictic certainty and their freedom from human bias. As an experimental science it has a great advantage in the fact that the observations made in the experiments must be vitalized with thought in order to be effective. There is in physics no mere staring at phenomena with whose appearance the observer has nothing to do, but on the contrary the things to be observed are produced by the student himself through the experiments he makes. Should the first observation not be conclusive, the experiment may be repeated until the student is satisfied that he has not only seen but understood. This form of observation offers an exceptionally fine field for self-activity of an educative nature, a field which is continually broadened by the ever increasing laboratory facilities that are being provided in public and private high schools.

DISCUSSION: — Compare observation in physics with observation in biology. See Section 50.

45. Starting with the twofold basis of mathematics and observation of experimentally produced phenomena, it can be seen that physics is capable of performing important educational functions, a few of which may be briefly noted: —

(1) It awakens anew that fresh, spontaneous interest of childhood in the events of the physical world which the schools have unfortunately put to sleep, for it has the most striking connection with the material progress of the world; as, for example, the manifold and amazing results in the realm of electricity, — the telegraph, telephone, telautograph, wireless telegraphy; also the many forms and uses of steam, gas, water and electric motors; microscopes, telescopes, spectroscopes (spectrum analysis), and other instruments, and then such modern wonders as liquid air, X-rays, radium, etc. Not the least advantage in thus reawakening the speculative interest in natural phenomena, is the fact that the rapid development of physics is constantly producing new wonders to stimulate and strengthen this interest.

(2) Physics enables the student to lay the foundation and to build the superstructure of his knowledge of the facts and laws of the mechanical world through mathematical insight and thought-saturated observation. Just as geometry may be developed from a few self-evident

propositions, or axioms, so physics may start with facts lying within the immediate experience of the student, and enable him, step by step, to construct for himself through his own experiments and thinking a body of knowledge that is free from the uncertainties of opinion and authority. Here there need be no ballast of historical data, dogmas, doctrines, or exceptions. The absence of these characteristics relieves the subject of the need of the memory-cram felt to be essential in many of the humanities.

(3) It forms a welcome counterpart to the training necessitated by the nature of the content of literary, artistic, and historical studies, as already indicated in a general way in the comparison of the natural sciences with the humanities. Helmholtz calls attention to this as a result of his own experience with students trained solely in philological subjects. He says, " What has been noticeable in my experience with students who pass from literary schools to scientific and medical studies, is, first, a certain laxity in the application of laws that are universally valid. The grammatical rules upon which they have been exercised are in fact accompanied with long lists of exceptions, and the students are consequently unaccustomed to trust to the certainty of the legitimate consequences of strictly universal laws. Second, I find them much inclined to rely upon authorities, even where they could form their own judgment. In philological studies even the best of teachers must refer the student to authorities,

because frequently he cannot compass the whole subject, and because the decision often depends upon æsthetic feeling for beauty of expression, which demands long training. Both defects rest upon a certain inertia and uncertainty of thinking, which will be injurious not alone in science studies. The best remedy for both defects lies in studies of a mathematical nature, for in them there is absolute certainty of reasoning, and no authority rules but that of the understanding itself."

(4) In an industrial society, physics has an important office to perform in fitting men and women not only for specific callings, but for the capacity to adapt themselves readily to new callings. The machine has taken the place formerly occupied by the tool; the factory has superseded the workbench. It is highly desirable, therefore, that the student should be master of the principles of machine construction and operation. This mastery of principles enables him not only to understand new machines, but to become quickly an adept in their management. It enables him to judge of the value of new inventions, also inciting and controlling his own impulses in this direction. The practical advantages incident to the study of physics are elaborated by Spencer in the first chapter of his "Education."

DISCUSSION: — 1. Extent to which physics should become a universal study: (*a*) for boys, (*b*) for girls. 2. Need of physics as a preparation for the various professions.

(3) *Chemistry*

46. An examination into the nature of chemistry shows it to be an inductive science essentially non-mathematical, with a fascinating history and a marvellous utility in modern industry. It has been developed through countless experiments, and to be effective educationally must be taught in the same way.

Unlike physics, the phenomena with which it deals, with a few exceptions, are not open to observation in the routine of daily life, but must first be produced under artificial conditions. This is its first difficulty.

Its second difficulty is due to the fact that the changes with which it deals cannot be observed by the senses, since they take place among the ultimate constituent particles (atoms, molecules) of matter. The experiment begins with certain materials, introduces certain conditions (juxtaposition, change of temperature, etc.), and concludes with certain results. The problem is to discover what chemical changes have taken place. This is a thought problem, which, if at the advance threshold of the science, demands a full use of known related facts or laws, and then fertility in the forming of hypotheses and dexterity in testing them, until the true cause stands revealed. Should the problem lie merely at the threshold of the student's knowledge, the same order (observation, hypothesis, verification) is maintained, but the discovery

of the true cause is abbreviated by the guidance of the teacher and his skill in proposing such problems only as the student with his present acquisition can hope to solve. Should the problem be to find the constituent parts of a mixture, the student is called upon to apply tests suggested by his previous experience, and then to form a series of hypotheses, each of which in turn is tested by the aid of previous knowledge, until the constituent materials are one by one discovered. Here is a direct challenge to the student's fertility of resource, and his persistence in effort, in which are involved the mental tension caused by expectation, and alert, thoughtful observation.

DISCUSSION: — Comparison of experiments in physics and in chemistry, showing their likenesses, differences, and educational effects. Section 47 to be included in the discussion.

47. A concrete problem taken from elementary chemistry will suffice to show the kind of mental activity involved in chemical experimentation. Suppose the problem is to find the cause of the formation of the ash-like substance seen upon the surface of base metals when they are heated.

The first thing to do is to heat the metal or metals in an open retort, when observation quickly shows the 'ash.' It will conduce not a little to the student's interest to learn that many centuries had to pass before men learned the true cause. An explanation of scientific method (observa-

tion, hypothesis, and verification) will prepare for the solution of this problem, and show the worth of exact and complete, and the worthlessness of inexact and incomplete observation. Since a knowledge of the truth can be adequately obtained only through the student's own thought, he is asked to propose a hypothesis as to the cause of this ash-forming seen on heated metals. Of course it will occur to him that the heat is a cause, but he will suspect that it is not the only one. It will easily occur to him that the air is present, and may perhaps be excluded. The teacher may suggest that it be displaced by hydrogen, which for the present is to be considered merely as a means for excluding the air. If now the heated metal remains untarnished in a stream of hydrogen, and the student is convinced that the air has something to do with the corroding of the metal, it is certain that this conviction will be confirmed and strengthened when he sees that with the return of the air the familiar color reappears on the heated metal. Even if it now seems to be proved that without the presence of the air the metal cannot change, that therefore the air exerts a direct influence in the change, yet the nature of this influence is still unknown. Further experiments (lessening of the volume of the air and changes in it caused by contact with the hot metal and increase in weight of the latter) lead the student through similar mental processes to be certain that the so-called 'ashes' on the hot metals are nothing more than combinations

of the latter with that part of the air which, without knowing what it is, one may say with confidence is the part that is most active in the burning of combustible bodies. The production of oxygen out of oxide of mercury, which immediately follows, brings this series of experiments to a close. Here follows naturally a glimpse over the history of this discovery: Knowledge of the ancients about 'ashes,' later called 'lime,' as well as the erroneous views of the nature of metals and their 'ashes' during the middle ages and later times, from Geber (800) to Stahl (1697); the complete overlooking of the influence of air and the consequent erroneous view that the cause of the corrosion lay in the metals themselves, and that consequently they might be changed to precious metals (the efforts to change base metals into gold lasted for 1500 years); the proposal of the *phlogiston* theory, which, though recognizing the 'calcifying' influence of the air, fell into another error by failing properly to observe the change of weight in the latter and the final elimination of this error by Lavoisier.[1]

The foregoing example gives an intimation of the mental processes involved in an experimental study of chemistry, as well as of the intensity and quality of interest that it is possible to arouse in the subject.

A brief summary of the most striking characteristics of chemistry as a subject of instruction may help the teacher

[1] Compare Baumeister, "Handbuch," Vol. IV, pp. xiv, 15–16.

to form a still more adequate idea of its place and function in education: —

(1) It is essentially non-mathematical and strictly inductive, so far as it is educative. Brevity of time and mass of desirable material may make memorizing of unverified facts and laws imperative at times, yet the real teacher will see to it that the subject is scientifically treated in numerous types of chemical investigation.

(2) Though a school subject, it yet admits of abbreviated investigation of important problems on the part of the student in strict scientific form (observation of fact, hypothesis as to cause, testing and verification of the hypothesis). The method of the classroom is, therefore, that of the research laboratory.

(3) As a laboratory subject, it shares with physics the advantage of inciting the student to use all his abilities, mental and physical, in the solution of problems.

(4) Chemistry stands closer to technology than physics even, and because of this fact may have, even in the high school, the stimulating effect of a professional study. A mere glimpse at the function of chemistry in industrial life shows its immense practical importance: chemistry of iron and steel; reduction of ores; refining of oil and sugar; manufacturing of dyes, starch, beer, wines, gas, paper, leather, lime, cement, soap, fertilizers, extracts; the proper nourishment of the human body, care of health, disinfectants, sanitation; to say nothing of its first great

function after the attempts at transmutation were given up, namely, the production of medicines.

DISCUSSION: — Comparison of mathematics, physics, and chemistry in the following respects: 1. kind of observation required; 2. nature of experiment; 3. quality of constructive imagination involved; 4. certitude of results; 5. progressive nature of problems to be solved; 6. demands upon memory; 7. appeal to inductive and to deductive reasoning.

(4) *Astronomy*

48. This subject, in so far as it demands higher mathematics, photography, spectrum analysis, and the telescope, belongs not to high-school but to university instruction. It is only as a part of geography that it is adapted to secondary education, so that a separate discussion of its educational merits is not needed.

DISCUSSION: — Educative value of brief popular courses in astronomy.

GROUP II. THE BIOLOGICAL SCIENCES

Botany, Zoölogy, and Physiology

49. We pass now from the exact to the inexact sciences, from subjects that are quantitative to those that are qualitative, from the rule of mechanical or chemical law to the law of life. This is a part of the world that is dominated by a new principle, that of growth, of organic development, of adaptation to environment, of evolution in the domain

of living beings. It has to do with organic bodies in which organs are at once means and end. As organs, or means, they serve the whole being; while as ends they are in turn served by the entire organism (nourished by the processes of digestion and circulation, protected from harm, etc.).

50. As the content and ruling principles of biology are different from those of the exact sciences, so it is natural that the educational functions should also be different. Biological sciences are also observational, but in a different sense. Without a knowledge of the facts and laws of the living world, the observational training obtained in chemistry would be of small worth in botany or zoölogy, for not only is observation bound up with thinking, it is also conditioned by apperception, by knowledge and experience in the domain concerned.[1] Observational training in biology, therefore, stands in a class by itself; it has no equivalent in the curriculum, for no other subject has to do with the germination, growth, nourishment, and evolution of living things, their qualities, conditions of health or disease, vital processes, life history, classification, economic and æsthetic functions. This topic is treated at length in Vol. II.

Biology is also an inductive science like chemistry, but with a different class of materials and an entirely different tone as regards rigor of logical process. Analogy plays a

[1] See F. Adams, "Herbartian Psychology Applied to Education," Ch. VI; also Lange, "Apperception."

larger rôle than in chemistry, anatomical comparison over a wide range of groups is needed for its larger generalizations, while many of its ultimate formulas still linger in the domain of doctrines, hypotheses, and theories. Inspiring, uplifting, and expanding they may be to the mind, but they have not been demonstrated in the exact sense in which the term is used in mathematics, physics, or chemistry. Think, for example, of the difference of view among men of science as to whether acquired characteristics are inherited or not.

Another difference between biological and physical sciences lies in the study of the function of organs or parts. For what end does the leaf exist? the stamen? the bark? the iris? the vermiform appendix? In the answering of such questions and similar ones regarding structure and location of parts, there is abundant room for observation and inductive reasoning, but of a quality not found in the exact sciences; for in the latter the idea of the function of a part in ministering to the whole does not occur, since they do not deal with organisms, but with mechanical relations or chemical reactions.

If mathematics and physics are remembered chiefly through insight into their principles, the knowledge acquired in biological sciences is held predominantly through what the Germans call *Begriffe*, that is, through organization into *classes*. So prominent is this fact that Bain calls botany and zoölogy the sciences of classification. Once

master the characteristics of a class, and the observer has at once a means for the identification of individuals which enables him to hold a vast array of facts within the grasp of a memory perhaps not of the strongest.

DISCUSSION: — Educational worth of biological training in classification.

51. These sciences are peculiar also in that they deal with living things, or with things considered as if they were living. The laboratory is therefore extended to the open field, thus relieving the student from at least a part of the constraint of the schoolroom. The study of the wonders of living organisms may easily lead to sympathetic regard for animals and plants, and in this way produce an emotional tone quite different from that natural to quantitative science, for though one might be said to 'love' a geometrical proposition or a chemical demonstration, it is not the same kind of affection as that which may easily be cultivated for plants and animals. That this sympathetic regard for the animal world is not always the result of biological teaching is a lamentable fact, due to callousness or carelessness on the part of the teacher.

DISCUSSION: — Comparison of an experiment in physics, with one in chemistry and one in botany, to show likenesses and differences.

52. A word, at least, may be said concerning the economic importance of having these subjects taught in the

high school. The proper understanding and utilization of plants and animals lie at the basis of our agricultural, horticultural, and industrial prosperity, for not only do plants and animals furnish practically the whole supply of food and clothing for mankind, but they also constitute the main source of raw materials for manufacture, and are consequently the very life blood of commerce. It is not enough that a few specialists from the universities should maintain experiment stations and tell the people what to do; there must be a substratum of botanical and zoölogical knowledge and interest on the part of the people themselves in order to make the experimental results of the specialist of value to the community. It is said that he is a benefactor of the race who can make two blades of grass grow where one grew before; he is, if he can teach and persuade all growers of grass to do the same, otherwise his extra blade will be of small service. The farms of the more fertile parts of the Mississippi basin have doubled in value during the last fifteen years, mainly because the research of the specialist was met by the intelligence of the farmers. It will always be fundamental to our industrial well-being for the high schools to lay the basis for a widespread popular interest in the study of plants and animals that there may be transmitted to the masses the practical results of higher research.

DISCUSSION: — What would be an ideal course in biology in a high-school course in agriculture?

53. Of all the pleas that Spencer[1] makes for the sciences as guides to life for the individual, that for physiology is the most convincing, for the problems of hygienic living are always personal and persistent, as are those that pertain to food, stimulants, narcotics, clothing, and shelter. The modern urban and industrial development has also brought with it a host of new temptations, dangers, and difficulties, such as a sugar and otherwise superabundant diet, a sedentary life for young and old, excessive nervous strain, and social amusements for which the past development of men has not prepared them. So far as food is concerned, the old danger was famine; the new danger is a kind of refined gluttony, for it is undoubtedly the case in prosperous communities that far more men and women die from overeating and drinking, combined with underexercise and nervous strain, than from lack of food.[2] This new danger incident to industrial plenty must be met by better and more extensive instruction in physiology and hygiene. Consequently the teacher is to be pardoned if he urges the practical, rather than the strictly educational function of this study. At any rate, for whatever reason he likes, he may urge a fundamental study of human physiology, in the high-school meaning of the term: the nature and function of the vital processes, like digestion and

[1] "Education," Ch. I.

[2] See S. N. Patten, "The Development of English Thought," pp. 379–387.

circulation; the functions, and limits of endurance of the central nervous system; and especially the general laws of hygiene.

54. Even if for no other reason, educational or economic, the study of botany and zoölogy is worthy of a place in every high school as an inexhaustible source of unselfish pleasure, comfort, and mental health and healing. Even the ancients recognized the importance of such study for similar reasons. Aristotle, in a noteworthy section of his treatise on the component parts of animals, contrasts two species of natural objects: the heavenly bodies, which in accordance with his predecessors he holds to be divine and inaccessible, and the plants and animals, "which are related to us by a certain community of life." "Both species of beings," he goes on to say, "have their interest; of the first we are able to comprehend but little, though the sublimity of the subject makes this knowledge more valuable than that of the world which surrounds us. On the other hand, the world about us has the advantage of furnishing us with more complete knowledge, which because the objects are closer to us and more intimately related to our nature we are warranted in placing alongside the investigation of those sublime existences. To him who has insight and is able to go back to the sources, living nature offers unspeakable pleasure, even with objects that do not flatter our sensibilities. It would be foolish and unbecoming were we to amuse ourselves with the mere contemplation of such

objects as they are portrayed in painting and statuary, rather than to study the natural objects themselves, whose causes we might seek out. We must not permit any childish repugnance to keep us from the study of the lower animals, since there is something wonderful in all the things of nature, and what Heraclitus said to the stranger who hesitated to enter when he saw the philosopher warming himself at the hearth holds likewise of them: 'You may enter with confidence; there are Gods here also.' Consequently we must exclude nothing in our investigation, since nature and beauty are found in all, — nature in adaptation to end and exclusion of accident, beauty as the summit of existence and development."

DISCUSSION: — 1. Extent to which the biological sciences in the high school should introduce the student to the genetic and evolutionary point of view. 2. Is æsthetic enjoyment of nature a legitimate end of biological science?

GROUP III. THE EARTH SCIENCES

55. The chief representative of this group in the high school is geography, mathematical and physical. Geology is better fitted for university than for high-school instruction, since it is more remote from practical interests than most of the other natural sciences, and since it deals with generalizations of a very comprehensive nature. It is interesting to note in this connection, that when science had a broad basis of theory and a narrow one of demon-

strated law, astronomy was the science most universally taught in secondary schools, but that now when demonstrable law and practical applicability outweigh even the most glittering of unproved theories, astronomy is a study for the specialist in the university or the observatory. This does not mean that its glories have become dimmed; they have in fact grown infinitely brighter with the advance of mathematical knowledge and the invention of new instruments of research, like the telescope, the photographic plate, and the prisms for spectrum analysis. It does mean, however, that the newer sciences from their greater definiteness and demonstrability have become much better suited to the intellectual and economic needs of youth than the more splendid but also more indefinite and difficult astronomical science, which gratified the wonder of our predecessors. In a less striking manner perhaps, but no less surely, geology, once the centre of scientific interest, has now followed astronomy to the university, and has likewise become a subject more of special than of general study and research.

DISCUSSION: — Extent to which astronomy and geology may still claim a place in the high school.

56. Mathematical geography, as its name indicates, is mathematical in character and shares the educational advantages and limitations of mathematical subjects, as described in preceding sections. It has certain aspects,

however, peculiar to itself which make it worthy of the few weeks of attention needed for its mastery.

The specific end and aim of mathematical geography is the exact and adequate location in space of any given point upon the surface of the earth. To effect this end it is first necessary to obtain clear conceptions as to the form and magnitude of the earth, then to devise artificial means (lines of latitude and longitude) for locating places upon the surface of this sphere, and finally to acquire a full knowledge of the movements of the earth in space.

It can naturally be seen that these problems are mathematical, not in the sense of algebraic calculation or geometrical demonstration, but only in the formation of geometrical figures on a gigantic scale. The imagination is called upon, not only to construct figures, as in plane and solid geometry, but to extend them until they compass the whole magnitude of the earth, of the solar system, and of the celestial sphere. It is in training the mind to facility and accuracy in thus expanding its spatial images that the peculiar educational worth of mathematical geography lies. This may not be the greatest thing in education, but it is unique, and worth more than it costs.

A moment's consideration will show how this expansion of spatial images is effected in mathematical geography. Suppose the observer chooses a convenient spot out of doors on a cloudless night to watch the apparent move-

ments of the stars. He sees that they rise, describe arcs across the vault above, and at last set, or disappear from sight. Reflection shows him that the arcs described by the stars are parallel, and that chords joining the rising and setting points of the various stars must be likewise parallel, one of which must pass through the point where the observer stands. Then by conceiving another line at right angles to the first, the four cardinal points of the horizon are fixed. Another line at right angles to the plane of the first two will give the two points, Zenith and Nadir. Still another line conceived to be the axis of rotation will give the north and south poles. Then the conception of planes cutting the earth in various directions must be formed, of which four are great circles; namely, the horizon (the earth being first conceived as it appears, a circular plane), the meridians, the equator, and the first vertical, which contains the four points, east, west, zenith, and nadir. Then we see that the equator cuts the day and night circle into two equal sections, so that at the equator day and night are each always twelve hours long. The notion of small circles also cut by the day and night circle but unequally except twice a year must also be conceived. We have next to think of the earth as a sphere turning on its axis and bringing all points successively into the sunlight, whereby the day and night circle cuts unequally the parallels of latitude north and south of the equator, except twice a year; also of the earth as circling

about the sun, the plane of the orbit (the ecliptic) being bounded by the path of the earth, and we must picture the axis of the earth declined twenty-two and a half degrees from a perpendicular to this plane and always parallel to its former positions as it moves along. Then returning to the surface of the earth, we must see how the arctic and the antarctic circles are fixed, perceive how and why zones and seasons are formed, and so on until we can accurately locate any given point on the earth's surface with respect to any other east or west or north or south. Whoever stands beneath the starry sky and constructs all these lines, circles, and planes, fixes all these points and clearly sees the mutual relations of all as they lie in the great space above, beneath, and around him, will have no difficulty in comprehending what the essence of mathematical geography is, and wherein consists its specific educational function.

DISCUSSION: — Function of maps, charts, and apparatus in giving students adequate conceptions of the foregoing.

57. General, advanced, or high-school geography appears under three chief aspects, according as the emphasis is laid (1) on the purely physical features of the earth, in which case we have physical geography as a branch of natural science; or (2) on the effect of natural causes upon the well-being of mankind, in which case we have anthropo-geography, the chief form of which with us is commer-

cial geography; or (3) somewhat equally upon physical laws and their effect upon mankind, in which case we have physico-anthropo-geography, which is Karl Ritter's conception of geography come to unity within itself and forming a connecting link between the natural and the historical sciences. Herbart conceived geography in this way and called it the *associating* science.

Recent physical geographies emanating from university centres emphasize the exposition of purely physical laws concerning land, ocean, and atmosphere, and content themselves with incidental reference to their effects upon man. High schools that have commercial courses, or that wish to emphasize the practical aspects of a study of geographical forces, are calling for commercial geographies.

A recent advocate of the Ritter conception is Professor Kirchhoff,[1] who thinks that needless confusion has been introduced into geographical teaching, especially in secondary education, by artificial division into mathematical, physical, political, commercial, and historical geography. He would bring these into unity, first, through a study of separate districts and countries which are minor geographic wholes (*Länderkunde*), home geography (*Heimatskunde*) being presupposed as an apperceiving basis; and second, in the high school, through a physico-anthropo-study of the earth as a heavenly body and the

[1] In Baumeister, "Handbuch," Vol. IV, XII, pp. 1–9.

home of man. The whole earth is studied as a macrocosm reflecting all its component minor unities, while the separate districts or countries are studies as *microcosms*, which though minor geographic unities still reflect and involve the whole. In other words, the study of the earth as such gathers up all the details of elementary geography, puts them into their proper relations, and gives the student a scientific grasp of that which he has previously learned as detail. "These," says Professor Kirchhoff, "are the two parts into which geography naturally separates.

"The general, or scientific geography views the earth as one of the planets of the solar system (mathematical geography), and then studies its atmosphere, its oceans, the structure of its land masses, the nature of rivers, glaciers, inland seas, lakes, the principles of plant and animal distribution, and the general reciprocal relations between the earth and mankind."

DISCUSSION: — 1. Is physical geography as a pure science of physiography justifiable in the high school? 2. Degree to which modern commercial geography satisfies the need of explaining the reciprocal relations between the earth and mankind.

58. The educational effects of geographical study will vary naturally according as one or the other of the aspects is emphasized. In general, however, it may be said that this subject unites in itself many of the advantages of the

exact and of the biological sciences, with others peculiar to itself. "Nothing," says Immanuel Kant, the first great German university teacher of this subject, "is better adapted to waken sound common sense than geography." It does this for two reasons chiefly; first, because it stimulates to a kind of thinking that is fundamental, one might almost say primitive, in character (think of primitive attempts to discover the component parts of the earth, the cause of geographical phenomena, and to explain the movements of the heavenly bodies), and second, because it has to do both with familiar phenomena and with human interests of great import. Nothing is more fascinating to the mind of youth, or more stimulating to his imagination, than his first organic view of the world as a whole, its development, its relation to other heavenly bodies, its interplay of forces, its influence upon the occupations, characteristics, and well-being of men. He delights to see, moreover, how men by thought and work can overcome natural disadvantages of climate and location, or by ingenuity and invention can utilize the natural geographical forces for his own advantage. Scientific geography furnishes us our first concrete view of evolutionary forces at work, and unites as nothing else can the world of nature and the doings of men.

DISCUSSION: — Place and function in secondary education of each of the three kinds of advanced geography.

CHAPTER IV

FUNCTION AND RELATIVE EDUCATIONAL WORTH OF THE STUDIES AND STUDY GROUPS (*Continued*)

B. The Humanities

GROUP IV. LANGUAGES

(1) *Linguistics*

59. The opening discussion in Chapter III gave a general view of the permanent content and educational functions of linguistic and literary studies. The study of language both in form and content is the oldest discipline for the training of youth known to man since the invention of written speech, and in many countries during long periods almost the only one. Up to comparatively recent times mathematical knowledge was limited to the Euclidian geometry; the various physical, chemical, biological, and earth sciences were either rudimentary or in a speculative stage of development; modern languages were for the most part in their vulgar or non-literary condition; while economics as a science was non-existent, and history a mixture of tradition, fact, and fancy. Language, therefore, in addition to its own inherent worth and necessity as a subject of instruction became the recipient of

the time and attention that may now be given to subjects which were then not in a teachable state of development. Now, however, when these newer disciplines are full grown, and are demanding the place in education to which their importance and perfected development entitle them, it becomes necessary to analyze anew the content and educational effectiveness of language, in order that, on the one hand, it may not be overestimated and continue to receive the emphasis which circumstances gave it in the past; and, on the other, which is perhaps still more important, that it may not be undervalued, and gradually sink into a position lower than that to which its permanent worth entitles it.

60. A glance at the difference between the primitive and the cultured man with respect to the need of language training will throw much light upon its educational value. Primitive men secure the requisites for survival, not by a thoughtful direction of the forces about them, but by physical exertion in hunting and fishing, the herding of animals, or by means of crude agriculture. In such an existence but little language, and that of an inexact kind, is needed. A vocabulary of a few thousand words suffices to name the important phenomena that affect the people, and to express their narrow range of thought, feeling, and volition. The thought content of the language of such a people is exceedingly simple, since it pertains only to the most prosaic affairs of daily life. It has and needs no fine

discriminations, no sharply defined conceptions, no wide-reaching generalizations. (Some primitive people are unable to count beyond ten.) The feelings of men in this state are massive and tumultuous, pertaining to matters of survival, such as military and other defence, the procuring of food, and the perpetuation of the species. Such feelings find expression in action and inarticulate cries more than in language; as, for example, in the rage engendered by combat or by jealousy; the fear that expresses itself by flight, or uncontrolled emotion; the love that finds expression now in joyous exaltation or dumb repression or heroic deed, now in physical endurance of self-inflicted torture. The vernacular as passed down from parent to child suffices for men in a primitive state; there is here no need of training the young through language, for the ordinary intercourse of life gives them naturally and easily all that there is to give.[1]

The case is very different, however, when a caste, as in India; a religious group, as among the Hebrews or the Egyptians; or a class of freemen, as in Greece, begins deeply and seriously to reflect and to record its thoughts and emotions, its insights and inspirations, in religious works like the vedas and the Hebrew Scriptures, or in literature and philosophy as among the Greeks and more modern peoples. Such groups no longer get their subsistence at first hand from nature, but become the leaders

[1] W. D. Whitney, "Language and the Study of Language."

and in varying degrees the exploiters of their fellows — the tribute-takers. They lay the basis for civilization, however, developing the arts and sciences, and making it possible for the whole race to lift its standards of life and thought; through their writings, moreover, they secure the advances made, enabling men better to understand themselves, relieving them of at least a part of the superstitious fears that paralyze them, and inciting them to greater conquests over thought and nature. At this point the need for language training becomes imperative, for "*Die Kunst ist lang, und kurz ist unser Leben.*" Since the young must be placed rapidly in possession of the intellectual and moral treasures of the past, it is necessary to train them first to quick and accurate apprehension of what is written, and then to equip them with skill in the use of the language they have been taught to comprehend. In addition to these formal facilities, they must likewise be led to make these literary, philosophical, and religious treasures their own through reflective study. Thus, for example, we find the education of the highest caste of Hindoo youth centring about the vedas, in their manifold forms and subdivisions, grammar being the foundation of all instruction. The Brahman regarded language as a divinity, and dedicated hymns to it. Resting upon the work of many generations, Panini, who is supposed to have lived at the time of Alexander the Great, constructed a canonical doctrine of language which treated

the laws of the Sanscrit in eight books containing four thousand rules, said by Max Müller to be more complete than the whole grammatical literature of all other nations giving a purely empirical analysis of speech. In similar manner, but with no such emphasis upon grammar, the Hebrews after the exile, when the language of the scriptures was no longer that of common life, placed their religious books at the centre of all instruction. Chinese education for thousands of years has been exclusively literary, great emphasis being placed upon memorizing and the art of constructing literary mosaics from the Chinese classics. The early Greeks, as is well known, had only two types of training for the children of the higher classes, the physical in the gymnasium, and the literary and musical in the school. All the peoples thus far mentioned used their own religious and literary works as the sole material for instruction in speech. The Romans, who borrowed the civilization of the Greeks, found it advisable or perhaps necessary to take the Greek language with Greek culture. At any rate, they appear to be the first people who utilized a foreign language in educating their youth.

DISCUSSION: — Extent to which the modern man still needs to have his literary education based on sacred writings.

61. Historically considered the linguistic or technical side of language instruction has always embraced, though

with varying degrees of emphasis, the three elements, grammar, rhetoric, and dialectics. The modern schoolman is not a little astonished to find how much weight has in the past been ascribed to these aspects of literary study in the training of youth. Their end and aim has always been the *mastery of the word;* with the Greek, for the adornment of life; with the Roman, primarily for oratorical, and secondarily for literary finish and efficiency; with the early Christians, for the purity, fulness, and convincing force of the sermon; with the middle ages the trivium (grammar, rhetoric, and dialectic), for perfection in the art of defining, distinguishing, proving, debating, and systematizing; with the leaders of the renaissance, for the development of an eloquence that should rival that of the best days of Greece and Rome. With all these peoples the formal mastery of the word was the very life-blood of culture, the necessary prolegomena to excellence in the domain of language and of everything to which literary excellence is the vestibule. Classical philology in modern times has different aims. Its chief undertaking is the ideal reconstruction of the entire life of a people, cultural and institutional. The writings of such a people constitute the original sources of information, and the study of their language furnishes the key to the treasures. Both the sources and the speech become, therefore, objects of research to the modern philologist. To summon the spirit of a departed age, she must cry, — " Speak that I may see

you." [1] But if in modern educational circles linguistic instruction assumes a more restricted, it has still a most important, function.

DISCUSSION: — Extent to which the old reasons for the *mastery of the word* are still valid.

62. The more a given group of studies is urged as a necessity in education, the more imperative becomes the need of determining its inherent worth, lest the traditional estimate of its value be over or under rated. We need, therefore, to perceive clearly the nature and content of such studies, that we may justly estimate their permanent importance.

To the modern high school, grammar is far more important than rhetoric or dialectics, since, first, it is indispensable for comprehending and using a foreign language, and second, because dialectic, or logic, is now remanded to higher education, while rhetoric is confined mostly to the mother-tongue, the effort to compose artistically in foreign tongues being now abandoned. The first great question, then, concerning the value of literary study is: what are the functions, what the limitations of grammar as an instrument for the training of youth?

63. Grammar in itself is nothing more than a systematic exposition of the forms which speech assumes in endeavoring to mirror with exactness the mental processes

[1] Compare Willman, "Didaktik," Vol. I, pp. 392–393.

in which language originates. Grammar applies alike to the commonplace and to the exalted, yet it partakes of the characteristics of neither the one nor the other; it inquires merely: (1) What aspects of thought does a given grammatical inflection or construction represent, and (2) What grammatical forms must be observed to express a given aspect of thought? In other words, as already stated, grammar is used both as a key to the understanding of thought, and as a guide to its adequate expression. It is like the natural sciences in that it takes an outer object, a word or a sentence, for observation and reflection; but it is unlike those sciences in that it always has an inner reference. The symbol is external, but the thing signified is internal, for it has to do with the thinking itself, and not only the thing thought about. This makes grammatical study a concrete sort of introspection, the vestibule to psychology and logic. Here for the first time in school study the student begins to think about his thinking, *i.e.*, about the adaptation of word and sentence form to the meaning they would express.

Negatively considered, since grammar is purely formal and is consequently independent of the content of the language to which it applies, we must conclude that there are many functions of science and literature that grammar does not perform. For illustration, it does not have the apodictic certainty of mathematics, for its rules and forms are subject to exceptions; the quality of mem-

ory demanded in grammar is different from that required in physics or mathematics, for it is the exceptions rather than the rules that are hard to remember in grammar; it furnishes no food to the imagination, however much it may incite to guessing, and is consequently lacking in all æsthetic quality; the emotions it leaves quite untouched except the painful ones incident to its perplexities; in itself considered as a system of categories it is as unemotional as mathematics itself, for it touches not at all the will of man, the weal or woe of race, country, or condition; it is indifferent alike to hope and despair, to love and hate, to good and evil, to the beautiful and to the ugly.

Positively considered, grammar is a pure intellectual discipline, but differs nevertheless essentially from other studies seemingly like it in intellectual quality. As above observed, it has two main purposes and one peculiarity. Its first purpose is to serve as an aid to the comprehension of what is written, especially what is written in a foreign tongue; its second purpose is to aid in using language correctly. In the mother-tongue these two aspects of grammar are somewhat equally emphasized, for as the mother-tongue is easy to understand, so up to a certain point it is easy to use. But with foreign languages both aspects of grammar become more important, for a foreign tongue is difficult for the beginner to understand, and greatly more difficult to use. For this reason composition in a foreign

language makes the second function of grammar particularly important.

The peculiarity of grammar as an intellectual discipline is that it turns the mind inward to observe the characteristics of its own thinking. This peculiarity and the exercise of the twofold purpose of grammar demand especial investigation, for in them we shall find the reasons why men consider grammatical training of so much worth to the young.

64. The importance of the introspective nature of grammatical study lies in the fact that it originates and develops the language consciousness. Primitive language sense is developed in the mother-tongue by intercourse with parents and companions, but language consciousness comes only when the mind begins to examine by inner reference, first the thoughts of others as expressed in speech, and then its own. Think, for example, of the mental training in speech consciousness involved in the study of the manifold ways in which assertions may be made, *i.e.*, in the study of modes. How does one think when one says, Were I not Alexander, I would be Diogenes; *Man sagt, der Koenig sei gestorben; Que voulez-vous que je dise?* What is the difference in the thinking when one uses now an intransitive, now a transitive verb; now an active, now a passive form? What aspect of thought is exhibited in each of the cases of substantives? Think, moreover, of the infinite variety that is given to speech and hence to thought by limiting or quali-

fying words, phrases, and clauses. In the study of foreign languages the mind is thus turned to the analysis of thought, not for a day or a week, but for years, and culminates in a new and higher language sense.[1] Apprehension of distinctions both broad and subtle becomes quick and keen; a sensitive feeling for the fine and noble in language, even if not in life, is engendered; the play of fancy, the flash of wit, the convincing force of logical conclusion, the appeal to sympathy, the resounding call to duty and noble living, all alike find a ready response in a mind thus trained. Such a man acquires the efficiency of the liberated tongue. What he has learned to note in the thought of others, he transfers in kind at least to his own thinking. Here is one great source of the difference, everywhere felt, between the educated and the uneducated man, even though by native endowment they may be equal. The educated man thinks and speaks clearly, definitely, concisely, making distinctions when they should be made, qualifying when qualification is needed; he can express adequately the emotion he feels; he knows what an argument is, and when it is conclusive, concerning any matter with which he is acquainted; and he has an appreciation for the subtle, the artistic, and the refined, which he never could have had had he been linguistically uneducated. In most respects the uneducated man appears the reverse of all this. His thought is general, and guided more by

[1] Compare § 77.

instinct than by trained intellectual force; his feelings are likely to be massive and primitive, and not easily expressed in words; his logical processes are simple in character and quite as likely to be directed by prejudice as reason; while his appreciation of the beautiful and refined is sadly limited by his unfamiliarity with the language by which they are expressed. In these and similar reflections one can perceive some of the reasons why grammar, as the vestibule to introspection, has been and indeed is so highly estimated as a means of mental culture.

DISCUSSION: — 1. Does the educational value of grammar warrant the isolated study of grammar as the first stage of instruction in foreign languages? 2. Distinguish between primitive and cultivated language sense, showing how language consciousness leads to the latter. 3. How can a study in itself unemotional still become a means of emotional control?

65. Turning now to the twofold aspect which grammar assumes in learning, first to understand language and then to use it, we have to examine the validity of the claim, made since first speech as such was studied, that it furnishes if not a universal, at all events an admirable training in logical thinking.

All the reasoning there is in grammar centres about a few logical relations, and even these need not be explicitly but only implicitly known. The sentence is the expression in words of the form of thought we call the judgment. From the nature of the judgment, the logical relations of

the sentence follow. There must first be the substantive to correspond to the first concept of the judgment, then the attribute to correspond to the second concept of the judgment, and then finally the copula, or the asserting part of a verb, to correspond to the mental act of affirming the second concept to the first, or of excluding it from the first wholly or in part. In this way subject, copula, and attribute arise. Since the attribute may be (1) a word expressing action, state, or being, (2) a quality, (3) a thing or class of things, and since a word expressing action, etc., may be united with the copula, or asserting element, it follows that what we call an attributive verb consists of copula and attribute united in a single word. In other words, the verb in this case performs two offices, that of asserting, and that of showing what is asserted. When, however, the attribute is not verbal, it is separate from the copula as adjective or noun.

Here we have the logical framework of the sentence. Then follow the modifications of the three main elements found in inflection, and modification by word, phrase, or clause, as exhibited in works on grammar. Nouns are distinguished as to person, number, gender, case; they are also classified according to logical categories. Copulas, or asserting elements, are inflected to show manner or mode of assertion, hence the various modes or moods; actions take place in time, hence there must be the idea of tense; actions vary as to cause, time, place, circumstance, etc.,

hence adverbial modification; qualities differ in degree, hence adjectives may also be modified to show this. The name of a modifier showing degree is also called an adverb. Then finally the noun attribute may be modified like any other substantive. Here in outline is the whole circle of thought found in grammar. It takes some maturity, such as is found in the high school, to comprehend the logical relations, but after all the range of thought is very limited and exceedingly simple. A bright student ought to be able to master the whole thing, in principle, in a week or less. If insight into fundamental grammatical relations were all there is to grammatical discipline, we might let our students come in their best clothes, teach them the grammar in the morning and give them a picnic in the afternoon. Mathematics, on the other hand, has to do with quantities and the ratios between them. In the beginning the quantities are more prominent, and the ratios very simple. As the subject develops, the ratios become more complex and the quantities continue to retreat from view, being represented by more and more complex symbols. The subject is therefore one of constantly increasing complexity and abstractness, it being more than possible for the student to lose all sense of concreteness and to juggle merely with symbols. But all that is essential in the thought range of grammar may be written on a single sheet of paper and mastered in a week, while men have not yet found the end in mathematics.

Some years ago one of the ablest of German mathematicians was accustomed to give a course of lectures each year outlining the advances in mathematics; but he gave up the attempt, for he declared that the discoveries in this field proved too great for him to follow. In their measure, the same is true of all the natural sciences. Nobody makes any new discoveries in the closed system of grammar, but thought never ceases in its onward march in science. The excellences of grammar as a mental discipline for the young can then hardly lie in a mastery of the limited thought system involved in technical grammar. In what does it lie?

DISCUSSION: — Compare the possibilities of development of the thought systems involved in grammar and logic with those in mathematics and physical science.

66. If Panini was able to formulate four thousand rules for Sanscrit, it must have been because the exceptions were treated as rules. Modern grammar, however, has comparatively few rules and many exceptions. It is in the use of rules and exceptions that the peculiar logical discipline of grammar consists. Every sentence is an illustration of fundamental rules, and may be of exceptions. When the student has to work up to his ability in translation, he finds constant application of his grammatical knowledge of both. A glance at the ending of a word may inform him whether it is a noun or a verb, and if a noun,

whether it is subject or object, genitive or dative. On the other hand, the form may not in itself show the true construction, when further tests must be applied. Fleeting hypotheses may be formed, to be approved or rejected by a new test, until the student is satisfied that he sees the meaning of the sentence. Then by a reverse process, he can quickly verify his first impressions, and discover if any word or form is still unaccounted for or has been incorrectly apprehended. In composition, say in a foreign tongue, the same process is involved, but in still more accentuated form, for it is easier to use one's grammatical knowledge effectively in translation than in composition. Needless to say, perhaps, the use of grammar in understanding or in composing in the mother-tongue is confined to those difficult points that demand the exercise of language consciousness. For the most part, the language sense developed since infancy suffices for the grammatical side of both understanding and composition. English grammar is consequently studied by American high-school students mostly for the mastery of the thought system involved and only secondarily for understanding and guidance in use. In the case of those whose language sense has been perverted by long practice of incorrect speech, grammar in the mother-tongue performs much the same functions as in the study and use of foreign language.

The thought in grammar is not the long, vigorous, unbroken chain so essential in mathematics; it is not con-

tinuous in length and breadth like that in natural science; it involves little of the mental persistence and plodding industry needed in mathematics and other exact sciences. On the other hand it is characterized by flexibility, alertness, and all-sidedness of insight and remembrance. Instead of having the longitudinal or chainlike form of exact science, it is, so to speak, *radial* in form. The student is incited to think in every direction in rapid succession concerning the inflection of words, their position in the sentence, the rules of syntax, and, above all, the exceptions. He must have at ready command the hundreds of forms shown in declensions and conjugations, both regular and irregular, and at equally ready command all the irregularities that adhere to syntactical rules. To be effective, this mass of knowledge, forming a great apperceiving resource, must be at instant command. The study of foreign languages has long been applauded for its training of the memory. One sees here why the claim is well founded as far as it goes. Every sentence examined or written, every word inflected or construed, calls for quick and accurate application of what is known. The student is like a sturdy mountain-climber when he is studying mathematics; but he is more like a skilful fencer when he is using his grammatical knowledge in translating, or is composing in a foreign tongue. In the first case he must march by laborious steps to his goal; in the second he must ward off every false impression and thrust to the

heart of the truth. Through grammatical study then we get, not depth, but versatility; not strength, but alertness; not insight into principle, but retention in memory; not a chain, but a web form of thought; not the onward march of experimental science, but the kaleidoscopic aspect of continuous application of a mass of rules and exceptions to a succession of sentences.

DISCUSSION: — What would be the educational worth of grammar should it remain unapplied to literature: (*a*) in English; (*b*) in foreign languages?

(2) *Literature*

67. The primary fact about literature, never to be forgotten by its teacher, is that it is one of the fine arts, and like all other fine arts it portrays the ideal through a sense medium, — in this case the word. It differs from history both in content and form, for history undertakes to narrate events, their causes and effects, as they actually occurred, and though at times its form may be what is called 'literary,' this is never regarded as more than accessory; whereas literature makes no attempt to chronicle events. Its truth is psychological and ethical rather than historical, while its form is æsthetic. The mission of history is to inform, to make the experiences of the past a lamp for the future; that of literature is to lift the thoughts of men above the commonplace, to inculcate ideals, to make men at home in the world of emotion, to stimulate them to

higher living. It takes its themes both from the outer and the inner world, striving to give an inner meaning to the outer forms of nature, or to make the inner world of feeling take on the visible aspect of the beautiful in nature, as in the cry of Emilie Gallotti, about to suffer an untimely death,

"Eine Rosa gebrochen
Ehe der Sturm sie entblättert hat."

Works of literature are monuments both to the spiritual life of the people from which they spring, and to the genius of the language in which they are written. It is for this reason that the modern philologist undertakes to reconstruct the whole inner life of nations through a study of their language and the literature in which the language is embodied. Literary and linguistic study, therefore, at the present time is much broader than in the past, when a single aim like oratory, or the imitation of classical style, often engrossed the entire attention of teacher and student.

Literature, whether in foreign languages or in the mother-tongue, embraces many forms, from narration, oratory, proverbs, and lyric verse, up to the drama and the epic, but everywhere we find the characteristics above described: ideals, emotions, aspirations, the noble, the good, the self-sacrificing, the patriotic — all portrayed positively or negatively in æsthetic form. A literary work is great according to the universal importance of the ideal truths it embodies, and the æsthetic quality of their ex-

pression. Some assert that the four great literary bibles of the race are the works of Homer, Dante, Goethe, and Shakespeare.

68. Such being the content and form of literature, what are its chief educational functions? Even if there were any need of teaching it for such intellectual training as is obtained through mathematics and natural science, it is evident that the nature of the subject is such that an effort to produce like results from literature would necessarily prove abortive, for literature has to do with ideals and emotions and beautiful forms, not with chains of logical thought, or with causes of natural phenomena. Freeman objected to teaching literature as a university subject on the ground that it deals with emotions, which are subjective and personal, and hence not fit topics for examination. One can examine on facts, laws, principles, causes, effects, etc., but how can one examine on states of personal feeling? Such an attempt destroys the feeling itself, leaving only the pale counterfeit which memory may retain. To meet this objection many teachers feed their students on the bare husks, the mere incidental accessories of literature, such as facts of biography, mythological references, etymology of words, syntactical constructions or rhetorical devices for producing effects; others preach ethical sermons, or make elaborate analyses of plot, structure, development, motives, — anything in short, rather than the literature itself. As John Burroughs expresses it,

the class fall upon a literary work as chickens in a barnyard fall upon a bone, picking it dry. In other words, they teach everything but the literature itself; they attempt to transform a work of art, which is to be understood and appreciated, into a colorless discipline for memory and of cheerless analysis for logical thought.

The remark of Freeman is not a reproach to literature as a high-school subject; it is only a hint as to its true function, which is to portray the ideal as conceived by the author through such beautiful forms as his genius may be able to create. The primary purpose of teaching literature, therefore, must be to lead the student to embody these ideals in his own conduct, to be at home in the world of elevated emotions, to appreciate the truly artistic in literary forms, and in his own little measure to be able to use them in expressing his thoughts. Secondarily there may be other purposes, such as orientation in the inner life of other peoples distant in time or space, or knowledge of the development of literary style in a given field, or indeed of general literary information and polish. Incidental and accessory ends are not to be contemned; they are only to be relegated to their proper position and importance as accessories.

DISCUSSION: — 1. Relative place and importance in the teaching of literature of the elements above named. 2. Was the old idea that each man could read English literature for and by himself educationally sound? 3. What is the justifica-

tion for teaching it, when there are so many other useful subjects that the student *must* study in school if he is ever to have any knowledge of them?

69. Formerly literature was taught in school only through foreign languages, but the literature of the mother-tongue has now won a place for itself in the high school. That it has often been taught for purposes not native to it, or has received more or less time than its importance demands, is due to its newness as a school discipline, and to the difficulties inherent to its proper presentation. Literature is now in the position that science was forty years ago; namely, that of frequent misconception as to aim and method. But the example of science, which has developed a method in harmony with its purposes, justifies us in believing that a similar development will take place in the teaching of literature.

How far the literature of foreign countries, especially that of the ancient world, should be taught through English translation is a question for the future to decide. On the one hand the period of classical study possible to the American high school is so brief that comparatively little literature can be read in Latin, and still less in Greek, so that if the student who does not go to the university for further study in these subjects is to know much about the real content of classic literatures, he must get that knowledge through English translations. On the other hand, it is urged, first, that translations, however good they may be,

necessarily lack the æsthetic form of the original, and second, that the time used in reading translations is so brief that but slight impression is made upon the student by the content itself. It would be an experiment worth trying for a class to spend six months upon Butcher and Lang's "Iliad" or "Odyssey." In the first place, these translations give the poetic imagery, and lack only the rhythm of the original hexameters, and in the next place such a study would give quite as much time to the content itself as could be given in reading the original, where a large part of the labor of the student is consumed in the effort to discover the meaning of the sentences. American high schools have never really tested the value of English translations of foreign classics, and until they have done so, the question of their value should at least be an open one.

(3) *The Ancient Languages*

70. The most obvious educational value of the ancient languages is the opportunity they give for the development of language consciousness through the long drill in making grammatical distinctions. The question naturally arises: Why not develop this consciousness through grammatical study of the mother-tongue? In the first place, the study of grammar by itself is nearly valueless for the development of language consciousness, since this depends not upon the mere knowledge that distinctions exist, but upon

long-continued exercise in discerning them in literary works. In the next place, English is not so good as an ancient language for this application, since with the disappearance of inflectional endings, the very distinctions which these exhibit have either disappeared or have become obscure. An instance is the modern disposition to ignore the subjunctive forms of the verb, and consequently the distinctions that these forms imply. Again, the thought content of English, and indeed of modern foreign languages, lies so near, and is of so much more apparent worth than the exercise of making fine distinctions, that both teacher and student instinctively turn to the thought and ignore the grammar. Were we content to do as our fathers did two generations ago, and laboriously parse the whole of Milton's "Paradise Lost" or Pope's "Essay on Man," doubtless we could achieve valuable results in the development of speech consciousness. It seems more fitting, however, to get this drill, say upon Latin, where long application of grammatical principles is a necessary part of the mastery of the language itself, and where the perception of thought distinctions is aided by highly inflected forms.

Since both Latin and Greek are candidates for a position in the modern high-school curriculum, and since both may justly claim excellence in developing speech consciousness, a new question arises; namely: Is the language consciousness developed by the one so different from that developed

by the other that we are justified in teaching both to secure this one end? Or is it worth the time and labor involved to learn two sets of symbols for one set of distinctions? Language consciousness thoroughly developed in one ancient language suffices for this type of training, so that the modern effort to exhibit the parallelism of the grammar of languages is justified and deserves much further development. After the grammar of one foreign language is learned thoroughly, the deviations from this type found in other tongues should be noted for their practical rather than their linguistic worth. This consideration has important bearings upon the educational worth of modern foreign language for the high-school student, as will be noted in Section 75.

With respect to the many-sided attention and the mental alertness demanded by composition in a tongue in which the language sense is not a sufficient guide, all languages are much alike, differing only in degree according to the stage of the student's knowledge and the difficulty of the task set by the teacher. Considering the narrow range of this closed system of thinking as seen in Section 66, it would seem as if former educational practice had greatly overworked this form of mental training. Here if anywhere in education the economic law of diminishing returns certainly holds.

DISCUSSION: — Limits of profitable study of grammar in foreign language, from the standpoint of mental discipline.

71. What is there in the content of ancient languages that makes them worth teaching to modern students? This question has been discussed, and at times actively debated, for the last four hundred years. The history of education shows how men's estimate of relative educational values has changed with the development of new views of life and the appearance of new subjects for study. We are concerned, however, not with past, but with present estimates of the content values of these studies.

It may be remarked at the beginning that it is not worth while to study these languages for what they contain concerning ancient history or the exposition of ancient military systems or political or social institutions, for since only facts and their causes are sought, all hindrances, such as strange words and constructions merely make it more difficult to learn the facts and to understand the causes. A translation of Aristotle's "Constitution of Athens" gives the reader easy access to an accurate comprehension of a political system, whereas the original would certainly cost more effort without yielding a better result. In the words of Weisenfels: "It is evident that with regard to political and military history, not only a wide, but also a fundamental knowledge can be found through the mother-tongue. The same thing holds with regard to concrete objects and so-called antiquities. In a few hours by instruction through the mother-tongue one can give his students a more exact knowledge and a better understanding of the

aspects of antique life, of geographical and topographical relations, of private and public rights, of the function of officials, changes in the constitution, and everything of this sort, than could be given by a full semester's work with the students upon the ancient writers themselves. The same is true concerning the accomplishments of the ancients in the realms of mathematics, mechanics, and natural sciences in general. Positive knowledge about everything that concerns the outer private, or the official public life of Greeks and Romans can be effectively learned without the aid of the Greek and Latin languages." [1] What is it then that cannot be learned at a smaller price than the mastery of the original text?

72. In seeking to answer the foregoing question, it must first be remarked, that in estimating the content value of the ancient languages one can hardly consider high-school instruction in them as an end in itself, for in large measure, especially in Greek, the high-school work is to be considered a mere preparation for continued study in the college or university. In the two years usually given to Greek in our secondary schools, the instruction is necessarily confined mostly to the linguistic side of the language, to the acquisition of a vocabulary, and to learning to read. Not until after he leaves the high school can the student hope to profit by literary training in the Greek tongue. The case is better with Latin, for after the 'Lessons' and

[1] "Handbuch für Lehrer Höherer Schulen," pp. 243–244.

Cæsar are out of the way, even the high-school student may come to genuine Latin literature in Cicero and Virgil.

That colleges and universities demand Latin and sometimes Greek as an entrance requirement to arts or other courses is a good reason for teaching them to students who are preparing for those courses, but since the fact that these requirements are made is only remotely connected with the inherent worth of Latin and Greek, it needs no further elucidation here.

DISCUSSION: — Should high-school instruction in Latin, and in Greek, be considered a whole in itself, or a preparation for future college work? If the former, what changes are needed?[1]

73. First of all, when one tries to show the educational worth of the content of ancient languages, one needs to

[1] The following from the report of Doctor Dunker, to be found in the Reports of the Royal Prussian Industrial Commission of 1904, published by the United States Bureau of Education, gives the impressions of a distinguished foreigner concerning our short courses in Latin: "In the preparation for practical life, the belief in the cultural value of Latin plays a much greater part than with us. Formerly it was the knowledge of this language that distinguished the literary man from the workman, and, with the tenacity of the parvenu in culture, many an American adheres to this idea. With the briskness peculiar to him he studies for a year, in four weekly lessons, the severe, difficult language of Rome, which demands years of devoted work. The idea is still quite prevalent that it argues extension of culture to be able to recognize a number of Latin roots in the Romanic past of the English vocabulary. The proud inscription, 'Per Pacem ad Libertas,' in one of the principal rooms of the Philippine exhibit at St. Louis, indicates the outcome of such classical culture."

examine two things: (1) the inherent worth of ancient civilization for the modern student, and (2) the extent to which the ancient view of the world, its thought, feeling, genius, and spirit, are inseparably united to their language. If it can be made out that these things are not worth studying, or that they can be just as well comprehended through the mother-tongue, then all those reasons for teaching the ancient languages that pertain to their content value fall away, and only the linguistic reasons for teaching them remain.

To one who sees that the modern world has developed from the ancient the causal connection of the two is self-evident, and it is clear that just as we study the earlier stages of plant or animal, so we must study the earlier stages of our present civilization if we would understand it aright. Both our political and our economic life have developed from Rome. To the Roman conception of national unity we have added the Anglo-Saxon conception of local self-government; while to the Roman laws for private property we have added the ideas of coöperation, both of capital and labor, thereby perfecting with the aid of science and invention higher forms of industry than the ancient world ever knew. But the two root ideas, public patriotism and private property, remain unchanged. Again, what does not the modern world owe to Greece in literature and art, in scientific bent of mind and in philosophy? The achievements of this ancient people are not mere objects of specu-

lative wonder, but they form the very life-blood of modern thinking and artistic creation. To students of the development of civilization, the indebtedness of the modern to the ancient world is so self-evident as to need no demonstration.

It being granted then that the products of antique culture are still worth studying, we have next to examine the claim that the true essence of this culture can be obtained only through a study of the languages in which they are embodied. This claim is not so self-evident, and indeed so difficult is it to prove, that even classicists themselves are sometimes disposed to ignore logical grounds and to make a religion of classical study, claiming for it the emanation of "an indefinable somewhat," which is the true essence of classical culture. The weakness of this position is that nobody but the worshipper himself is impressed by it.

The case, however, is not so bad as to need such desperate remedies. To the philologist, who says to an ancient people, "Speak that I may see you," it has become an axiom that the language of a nation is the mirror of its inner life; for what is language but the expression of what is deepest in the intellectual, moral, and æsthetic life of the people who use it? Even in these modern days of international commerce of goods and thoughts, the same thing is essentially true, as seen in English, Germanic, and Romance languages; how much more true then must it be of a language that is the expression of a closed

system of national life! This inner spirit expresses itself not only through inflectional endings and sentence structure, showing wide-reaching distinctions as well as subtle shades of thought, but especially also in the artistic forms of lyric, dramatic, and epic verse. To miss these linguistic forms and artistic refinements when studying the content of ancient civilizations, is to contemplate a body from which the life-giving spirit has departed. By means of this immediate contact of the youthful mind with that which is eternally young in the thought and emotion of the race, the youth is able to clear up his inner world, and to protect himself against the conventionalities that compass him about. Here he is able to feel the full pulse of that ancient world which, though now pronounced old, is still ever young, in that he penetrates deeply into the idioms, the linguistic refinements, and the artistic perfections of the ancient literary masterpieces. With the Roman he feels the force of death-defying love of country, the need of political unity, the sacredness of private right and public duty; with the Greek, he feels the force of beautiful creations, the musical accord of body and soul, the force of accurate thinking and philosophic comprehension. If, unlike the Greek, he accords these insights, efficiencies, and aspirations to all men according to the measure of their ability, opportunity, and ambition and not only to the few alone who are called the free, why then these mental treasures grow rich as they become universal.

DISCUSSION: — 1. Value of ancient languages as products of ancient civilizations. 2. What classes of students should be advised to study Latin? Greek?

74. The ancient languages have other educational values more specific than those mentioned above. The English language is particularly rich in Latin roots, while the nomenclature of science is largely derived from the Greek. For this reason both languages are of importance in the study of English etymology.

To the specialist in philology, archæology, or in literature, perhaps also in history and philosophy, they are a necessity, since they form the sources whence all real enlightenment comes. The cry of modern scholarship is always, *Back to Sources.* Indeed, it may be declared, once for all, that to the scholar as specialist these languages are the necessary tools for his investigations, since without them he is like a man in a fog, having to feel his way.

Many other claims more or less well founded have been made for the study of ancient languages, and many eloquent words have been uttered on their behalf. Thus, Goethe says that a man who knows no foreign language cannot adequately know his own; the saying, "one has as many souls as one understands languages," is attributed to King Theodoric and also to Emperor Charles the Fifth; to Von Humboldt is ascribed the assertion that there lies in every language a specific view of the world and that the student gets a new view for every foreign language he

learns; Fichte said, "The language treasure of the scientific world lies in the ancient tongues;" a modern work on Thomas Aquinas declares, "The church everywhere takes with it the Latin language and the dogma developed after the thought forms of the Greeks, so that Greek wisdom and Roman power follow her, however far she may wander through the centuries; so likewise do the sons of the proud Brahmins on the Ganges learn Latin and study the Aristotelian philosophy, as thousands of years ago the sons of Franks and Saxons began to exercise themselves in Latin speech and Aristotelian dialectic."

One need not rely on the voices of the past, however, for one's estimates of the value of these old subjects, for they assume new aspects with every generation. Each period must examine them anew. The modern teacher can easily fortify himself with facts and reasons applicable to his time, by examining their linguistic function and the comparative worth of their æsthetic and ethical content.

DISCUSSION: — Relative validity of the foregoing claims.

(4) *The Modern Foreign Languages*

75. French and German, the modern foreign languages most taught in American high schools, may to a certain extent perform the same functions in education that the ancient languages do. Their position, however, as living languages, renders them less fit than the ancient tongues for some purposes, and more fit for others. It is

generally declared on the one hand and conceded on the other that French and German are not so well adapted to give thoroughgoing linguistic training as are Latin and Greek. The reasons are not far to seek. In the first place, they are less highly inflected, so that thought distinctions are not so perfectly mirrored in grammatical forms. In the next place, it is much easier to gain a reading knowledge of modern than of ancient languages, and the student therefore more quickly comes to the point where the content is of much more subjective value than the form. In addition to these inherent reasons, we have the additional consideration, that such linguistic training, even were it possible, is not desirable where there has been thorough grammatical training in an ancient language. On the grounds, therefore, that good linguistic discipline can be more effectively obtained elsewhere, and that when Latin has been well taught, further discipline of this kind is not so desirable as other things, we may fairly come to the conclusion that the earlier attempt to teach French and German in the same way and from the same motives that Latin and Greek are taught should now be abandoned.

If, however, French and German do not easily yield the grammatical training of the older languages, they have certain advantages that give them an especial educational value. As living speech they are capable of furnishing to ear and tongue a training that is comparable to that furnished to the eye by Latin and Greek. They have, more-

over, a vast body of literature that has sprung, not from heathen, but from Christian sources, and which mirrors life as it is, and not as it was. In addition to these strictly educational values, they have also great worth as instruments of research and communication.

It is the good fortune of English-speaking peoples that both French and German are philologically closely related to the mother-tongue, and hence comparatively easy to acquire. The basis of English is Anglo-Saxon, while a large part of its subsequent acquisition is Norman-French. The latter fact explains also why at least the beginnings of a Latin vocabulary are so readily acquired by those whose mother-tongue is English. Considering, then, the inadequacy of French and German to furnish the best grammatical training, and their superiority as to practical utility and literary wealth, how shall we realize most fully their value for modern education?

The new European reform movement for the teaching of modern foreign languages embraces the following main features: —

1. There must be a free and accurate enunciation of elementary sounds, a ready and correct pronunciation of words, fluency in reading, and correctness of intonation. The basis for this training of ear and voice lies in comparative phonetics, as exhibited in the Vietor system.

2. Grammatical knowledge of a modern foreign language is to be limited to what is strictly necessary to an

understanding and use of it, and must never be separated from the living content. The basis for this linguistic mastery lies in an inductive grammatical study of what is read.

3. Students shall be trained to a ready and accurate use of the language as fast as they learn it. The achievements of Director Walter and his colleagues of the Reform Gymnasium at Frankfort a. M. in training students to use the words they learn are worthy of study by American teachers of modern foreign languages.[1] Training in writing and speaking a modern foreign language shall not cease until the student possesses, not only a language consciousness for the new tongue, but also a language sense, which forms an instinctive guide to correct usage. For example, the American student of German shall be able to use the correct gender of nouns without having to reflect upon the matter.

4. Through the study of literary masterpieces, the student shall gain a comprehensive view of the national culture, past and present, of the people whose language he studies; also familiarity with their modes of life and thought. In other words he shall be able to think, feel, and, if desirable, act as a German or a Frenchman would.

How much room for future achievements these ideals open to American teachers of French and German can be inferred from an inspection of our present accomplishments in this field.

[1] See J. E. Russell, "German Higher Schools," pp. 266–290.

DISCUSSION: — 1. Attempts of Comenius to associate Latin words directly with ideas. 2. The Berlitz and other conversational methods. 3. The graphophone as a language-teaching instrument. 4. Should American instruction in French and German aim to develop the power simply to read, or should it also train pupils to compose and to converse? 5. Compare American with foreign literary and industrial conditions.

(5) *The Mother-Tongue*

76. The Greeks appear to have been the only European people who were able to educate their children without deeming it necessary to teach foreign languages. Some may think that having the best language for their mother-tongue, they naturally needed no other; while others might take the ground that all valuable knowledge was better exhibited in Greek than in any other language. At any rate in the early days, before the rise of philosophy, they were content with the literary treasures of Homer, while later they added the linguistic training devised by the Sophists. It would at least be an interesting experiment to see what an American high school with good teachers could accomplish with a curriculum without foreign languages, and with as much time given to English as is now devoted to the combined study of English and foreign tongues.

The modern scholar in Germany stands in sharp contrast to the ancient Greek. If the Greek confined all linguistic and literary training to his mother-tongue, the German has devoted so much attention to foreign lan-

guages that he has paralyzed his power to use his own, at least in public speech. The following sketch from Lyon [1] shows the result and then the cause: "Whoever contemplates the history of our parliamentary oratory is astonished at the helplessness with which at the beginning the language-trained German appeared in public. It was only gradually that he attained the command of free oral speech, and even to-day good speakers, those who have a really good style, are a rarity in Germany. Many of them tremble even yet when they are to speak in public, and the most of them lose themselves in helpless windings or in whole series of meaningless sentences and repetitions. All this is to be explained by lack of practice and consequent embarrassment. It is precisely the representatives of our highest culture who show this weakness most. What most prevents our German public speakers from having a happy fluency of oral speech is the fear of making mistakes, with which fear our youth are thoroughly inoculated, since in our schools correctness of speech in German and foreign languages takes precedence over everything else. Prince Bismarck, however, almost never used smooth sentences and faultless constructions, yet his speech came like molten metal, clear and penetrating and overpowering through the forceful structure of the whole."

[1] "Der deutsche Unterricht," in "Handbuch für Höherer Schulen," p. 197.

Since 1890 when the German Kaiser declared that the German gymnasiums lacked a national basis, and that for the future they must be more concerned with educating young Germans than young Greeks and Romans, additional attention has been paid to instruction in the German language. Countless monographs, elaborate text-books, and now even a colossal "Handbuch,"[1] are devoted to the subject. Similar movements are now in progress in other European countries.

DISCUSSION: — 1. Educational merits and defects of a secondary education without foreign languages. 2. Other influences in the study of foreign languages that tend to impair the facile use of the mother-tongue? 3. What aspects promote facility in use?

77. Modern schoolmen have ceased to have doubts as to the adequacy and necessity of the mother-tongue as the great instrument of science, of commerce, of culture, of political and social life, and of daily communication both oral and written. The questions which divide them are: (1) Do we need any specific instruction in the vernacular, which is of necessity the primary presupposition of all acquisition and expression of thought? Is not the native tongue the natural inspiration and expiration of the soul? Why teach English to English-speaking students any more than we teach breathing? (2) Can the mother-tongue be

[1] Matthias, "Handbuch des deutschen Unterrichts an höheren Schulen."

made an effective instrument of linguistic and literary training? Does it not lack inflection? What can take the place of translation as an ever present means of inciting the youth to linguistic effort and of furnishing him with an exhaustless method of discovering and solving linguistic problems? Is not the translation of Latin and Greek texts the best possible training in composition? Do not the reading and appreciation of literature in English come of themselves when a student is admitted to the library? Like reading with Dogberry, do they not come by nature? Why try to teach them?

It has been shown above that the ancient languages are of great and presumably of permanent importance in the development of what is called *language consciousness*, but we must also at once admit that this theoretical insight into the intricacies of speech no longer, in the case of the foreign languages, passes over into that stage which we call *language sense*, whereby one instinctively uses the language correctly for oral and written communication. Since Erasmus few have been able to use Latin like a mother-tongue. Furthermore, no study of ancient languages appears to enable the student to transmute the *language consciousness* derived from them into a complete language sense in the mother-tongue, unless perhaps in the matters of diction and of insight into distinctions of thought. Translation, which must perforce follow the sentence if not the word order of the original, may indeed enrich the diction

and sharpen the wits, but how can it be depended upon as the sole means for producing a fluent, untrammelled flow of original thought in the mother-tongue? Without this free flow, as from a fountain, a genuine, far-reaching language sense for English can hardly be said to exist.

The chief function, then, of English as an object of special study in the high school must be conceived to be transmuting the language sense which our birthright gives us into a higher language sense by means of the language consciousness developed mostly through foreign tongues, but also in a measure through the study of English itself. The cycle is as follows: (1) the immediate language sense inhering in the vernacular; (2) the language consciousness obtained through linguistic study of English and foreign languages; (3) the resulting scientific and literary language sense, which is one of the noblest possessions of the educated man.

That this crowning achievement can never be completely attained without a direct study of the vernacular itself is the prevailing conviction, not only of English-speaking, but also of other modern culture nations. To the first question, then, Do we need instruction in the mother-tongue? the answer must be an emphatic *yes*. To the second question, Can the mother-tongue be made an effective instrument for creating the higher language sense? the answer is, it has already been made such an

instrument to a degree that warrants further efforts at development.

If science was able in forty years to perfect for itself a method that places it on a plane with the best that the humanities can exhibit, why should not the teaching of the vernacular be capable of similar didactic development? The English teacher is in the happy position of the early American who saw before him a continent to develop. If Chatham could then exclaim, "Were I not an Englishman, I would be an American," so can the teacher of ancient languages likewise exclaim, "Were I not a teacher of the old, I would be a teacher of the new."

Concerning the need of teaching English literature in the high school there can likewise be no serious question. That it is perhaps the richest literature of all times is claimed by Anglo-Saxons and often admitted by the scholars of other nations. As such it is worthy of attention in the school. If the Greek could find almost his whole intellectual and ethical training in a far less developed literary treasure, surely we can find enough such training in one that is far greater, richer, and more diversified to warrant us in devoting the necessary time and labor to this end. It is too early to know whether this school instruction in literary masterpieces will materially aid in producing literary masters; but of this we may be assured, it will help to produce a vast body of appreciative readers for the masterpieces that have been or

may be produced. It will appreciably raise the literary standards of our people, and conduce to the development of that unalloyed happiness that comes from communing with the ablest and purest minds the world produces.

DISCUSSION: — 1. In what ways does the study of foreign languages promote the higher language sense in the English? 2. Analyze into its prominent features the best English instruction observed in secondary schools.

GROUP V. THE FINE ARTS

78. The fine arts are architecture, sculpture, painting, music, and poetry. In the high school they are represented mostly by drawing, singing, and literature, and to a certain extent by moulding, designing, elocution, and rhetoric.

Having in view the fact that the technical element of art is more prominent than the intellectual mastery of its fundamental ideas, or the æsthetic appreciation of its merits, German writers on education often regard drawing and singing as mere techniques (*Fertigkeiten*), and attach them to the course of study as desirable appendices. Such a disposition of the fine arts not only belittles their importance in education, but also obscures the organic nature of the curriculum. No study is worth much in education without its technique, and conversely no technique is worth much that is not grounded in insight, that is, in intellectual mastery and æsthetic, ethi-

cal, or other form of appreciation. The two elements, insight and technique, however, vary greatly in their character and relative emphasis.[1]

79. Art has two elements, one of content and one of expression, and might be defined as a means of revealing the ideal through a sense medium. The content of art is therefore of an intellectual or conceptual nature, while its material means of expression (stone, brick, wood, bronze, marble, color, tone, word) appear in the three forms of regularity, symmetry, and harmony. The ideal, or conceptual element may rise from the simplest to the most exalted theme, as from Goethe's violet crushed by the foot of the careless maid to the greatest conceptions of classic and religious art as seen in the Apollo Belvedere or the Sistine Madonna. The sensuous element may likewise range from the simple rhythm of monotonous repetition to the perfect harmony of diverse elements as seen in the Parthenon, the Winged Victory, the Last Judgment, a Beethoven symphony, or a tragedy by Homer, Goethe, or Shakespeare.

Æsthetics as a department of philosophy undertakes to explain the fundamental conceptions of art, and to show why the various combinations of the sensuous elements please and elevate the mind. Even an elementary study of æsthetics will greatly aid the teacher in enabling him to cultivate in his students an appreciation of art.

[1] Compare Section 88.

One of the most important of the many treatises upon æsthetics is that by Hegel, of which Dr. Wm. T. Harris has given a concrete outline in his "Psychologic Foundations of Education." A more modern work of much value to the teacher is William Knight's "Philosophy of the Beautiful."

As Dr. Harris says, "The three highest activities of the soul deal with the beautiful, the good, and the true." Science in the broad sense reveals the true; ethics and religion deal with the good, while æsthetics deals with the beautiful. To the high-school student, however, the beautiful appears not as abstract theory, but as concrete art. If he is to have his powers of appreciation and his skill in execution developed, it must be through contemplation of works of art and practice in representing them, chiefly through drawing on the one hand, and singing on the other. The æsthetic importance of the study of literature has already been considered, so that what remains is to show in outline the specific educational functions of drawing and singing.

DISCUSSION: — Compare Hegel's "Philosophy of Art," as seen in Dr. Harris's "Psychologic Foundations," with the origins of art as exhibited by such writers as Spencer, Grosse, and Hirn, as a guide to the teaching of art.

80. The first and most obvious function of these arts is to enhance the student's powers of æsthetic apprecia-

tion for the forms of art involved in drawing and singing, since these exercises give an insight into the laws of regularity, symmetry, and harmony as elements of expression that can be obtained so effectively in no other way. The exercise of these arts, moreover, helps to develop the mind's latent power of appreciation of what is most satisfying in the ideals of art.

In addition to this general function of these high-school forms of art study, each has important specific functions. Drawing trains the eye and the hand, whereas singing trains the ear and the vocal organs.

A new sort and quality of observation is demanded the moment the student tries to represent objects by the aid of the pencil, for not only must he see precisely all the details of form, but he must look at the world as if it were flat, and yet must at the same time see how its depth can be represented by shade and perspective. When one considers for a moment the enormous importance of sight in the formation of our mental images, one can perceive the educational significance of such a systematic training in exactness of vision as is involved in drawing. Nor is the value of this training limited to the æsthetic field, but extends into almost every department of practical life, finding its applications in all the natural and most of the humanistic sciences, as seen in the designing of machines, in manual, decorative, and other useful arts. In all of these, the sure eye and the skilful hand, so highly

prized by Rousseau, find unlimited scope. Drawing, therefore, in high-school education has three educational functions not fulfilled by any other department of study: (1) It contributes to æsthetic appreciation the element that comes alone through efforts to construct the æsthetic forms of space; (2) it compels a kind and keenness of observation not found elsewhere, in that it combines exactness of detail in observation of tri-dimensional objects with their representation in two-dimensional space; and (3) it makes the hand skilful, not only in a fine art, but also in many useful arts.

Modern nations have become aware of the fact that art instruction in the schools has immediate and important relations to industry. England learned this at her first world exposition in 1851, and the American public became increasingly aware of it in 1876 at Philadelphia and again at Chicago in 1893. To cite an instance, — Sweden and Norway, the inventors of wood sloyd, were so inartistic in their productions that in 1881 they were able to export to the United States but $137 worth of manufactured wooden articles, whereas Belgium, a nation having the artistic qualities of the French, sent $118,146 of this class of goods, *i.e.*, nearly one thousand times as much. Other causes may have entered into this result, which, however, is so startling as to be instructive.

"In 1851, at the World's Exposition in London, it became evident that English industries were not of such

a character as to compete with those of France and Belgium. Prince Albert, wise and thoughtful as he was, set about a deep-reaching system of education that should correct the national defect and recover the prestige of British arts and manufactures. The South Kensington Museum was established, and day and evening art schools set up in all manufacturing centres. The museum placed at its foundation a collection of works of art showing the history of art — its beginnings, its high-water marks, and its fluctuations. On this basis instruction was given in those forms of ornamentation that the world has pronounced beautiful. There began from this time a gradual rise in the taste of the English workman; from being an artisan pure and simple he began to be an artist. England has gone forward rapidly in the direction of producing works of taste, and her useful manufactures, heretofore made without reference to beauty, have improved in tastefulness of design and execution.

"The establishment of a great national art gallery, the Louvre, and the studies of French savants in the canons of good taste had long before revolutionized French manufactures and given France the supremacy in the world market for goods that command high prices and ready sale.

"Taking hint from England, we have had in this country something of the fever for education in art, especially in the lines of industrial drawing. Remarkable as has

been our progress in the matter, yet there is a prevalent lack of insight into the true direction and significance of this branch of industrial drawing. We have had much stress laid on geometric drawing and the construction of working drawings, as well as the old-fashioned system of drawing pictures of objects, and we have had much invention of original designs, founded on the basis of regularity and symmetry, but we have had very little of a really high order of æsthetics." [1]

Singing trains the ear in the perception of tone and rhythm and to the sure distinction of musical intervals, while at the same time it develops the vocal organs and contributes materially to correct breathing. It is through singing that the student gets his first clear insight into the nature of vowels and consonants, in that he finds the vowels can be prolonged while the consonants as a rule cannot. The breathing exercises possibly help the student to acquire a feeling for the correct construction of sentences, as he must take breath at the right places. This again aids in good declamation, while the developed sense of rhythm and time contribute to an appreciation of the same elements in poetry. Singing, then, has also three great educational functions not adequately performed by other subjects: (1) It contributes essentially to the appreciation of those forms of art that

[1] Wm. T. Harris, "Art Education the True Industrial Education," Report National Commissioner of Education, 1904, pp. 1134–1135.

find their expression in *time*, primarily music and secondarily poetry; (2) it trains the ear to nice discriminations in sound and rhythm; and (3) it develops the vocal organs. In these ways singing contributes to the perfection of one of the purest and most gratifying accomplishments known to man, that of vocal song.

DISCUSSION: — 1. Extent to which music should be taught to the unmusical and drawing to those inapt with the pencil. 2. Compare free-hand with mechanical drawing as to artistic value and practical effectiveness. 3. In what respects may the scientific imagination be deemed æsthetic?

GROUP VI. HISTORY

81. Fundamentally, history is the story of man and all that favors or hinders his progress in well-being — the influences of his environment whether natural or human that have affected him, the responses he has made to the stimuli of this environment, the institutions he has devised to fix and transmit his advances; in short, the whole account of his efforts, mishaps, failures, and successes as a social being.

The leading theme of history, however, is political progress; the rise, growth, and development of states, nations, empires; their collisions, conquests, and alliances, all to one great and often unconscious end; namely, the progress of the individual in civil rights and duties, his development toward freedom and self-government. To the

astonished eye of youth, history portrays the superlatively great in human affairs; great battles, the clash of empires, supreme national exertions and sacrifices, all-compassing patriotism and self-sacrifice on the part of the leaders of society, towering ambitions, overpowering military genius, and epoch-making initiative on the part of statesmen and warriors. It is in history that the young first learn to regard the present as the last attained stage of a mighty evolution, and thereby acquire reverence for the vicarious sacrifices of the past, regard for the civil liberties of the present, and a sense of responsibility for the civil welfare of coming generations.

DISCUSSION: — Should history be regarded as a generalizing science like economics, or as one that merely traces specific effects to their specific sources? See Publications of the American Economic Association, Third Series, No. 2, pp. 137–199.

82. Besides influencing and even forming the student's permanent attitude of mind regarding civil rights, duties and responsibilities, history performs a number of intellectual and ethical functions that are largely peculiar to itself, the most important of which may be mentioned.

1. History is preëminently the realm of the contingent, that is, of a class of causes and effects which, unlike those revealed by natural science, do not follow the invariable order of natural law, but are influenced and sometimes determined by circumstances that might have been other-

wise. This does not mean that no law can be observed among these phenomena, for that would not be true. Yet these laws lack the apodictic certainty of those realms of science with which the will of man has nothing to do. For illustration, the result of battle often depends not upon numbers and equipments alone, but upon accidents of field and flood, the unforeseen presence of natural obstacles, like the sunken road at Waterloo, the freshness or weariness of the troops, their flood and ebb of courage, the genius, stupidity, jealousy, caprice, intelligence, or information of the officers. The mental attitude of a people is generally influenced if not determined by their economic situation; often by prejudices engendered by the quarrels, sometimes personal, of party leaders, and not seldom in the past by differences in religious opinion and practices, whereby men not unfrequently lost their natural reason. In short, historical results are a resultant of forces both natural and human, wherein the accidents of the one and the defects of the other play their part. If it is insisted that these causes are still "natural," and the results inevitable, then it must be urged that these causes are often indeterminable, so that both causes and effects are nevertheless contingent.

From the contingent nature of historical causes arises the first great function of historical training; namely, the development of judgment respecting the civil affairs of men. This judgment enables its possessor duly to weigh

the motives, preconceptions, prejudices, and capacities both of individuals and communities; it enables him to estimate the probable effects of deviation from fundamental principles, to forecast the transforming force of new conditions of political life, like the influence of trusts and labor unions, or property and intelligence qualifications for suffrage; it shows how dependent political opinion is upon birth, geographical location, and supposed economic advantage. The satirist sometimes declares that when the rains fail along the western border of the Mississippi basin, the farmers let their hair grow long and start a new political party. If on the one hand, however, the historical student is inclined to condemn the weakness and inconsequence of political opinions, he may on the other easily satisfy himself of how true and faithful even unto death the people are when the great seer reveals to them in unmistakable terms their sacred rights and their more sacred duties.

2. Next in importance to training in sound political judgment, and growing out of the contingent nature of historical causes, is the spirit of toleration thereby engendered. He who reasons mathematically concerning the right or wrong of historical actions is necessarily intolerant, for mathematics has no place for caprice, interest, personal bias, or the influence of birth or party affiliation. But historical judgment can take note of these and other contingent causes and can enable the

judge to put himself in the other man's place, to see with his eyes, feel with his heart, and act with his decision and energy in the same way he acted. When men are in the midst of heated conflicts, either of arms or ideas, they are prone to forget toleration and sound political judgment. It is history, which views events after the fires of partisanship are dead, that enables men to recover their lost perspective, to understand aright, and finally, when judgment must be passed upon the moral aspect of any great struggle, to pass it with a full knowledge of all the contingent causes and with a magnanimity of spirit that transforms the partisan into the patriot. It is this spirit that robs defeat of its sting and victory of its exultation over a defeated opponent. History sends the youth into the world disposed to be fair and tolerant toward his fellows whether in party or in national opposition, to be predisposed to free himself from prejudice and unreason, and to regard political differences in the light of all the circumstances. How much unreasoning hatred toward England has in the past been engendered in American youth by the study of history written in the spirit of partisanship and intolerance! Happily that epoch is now past and we are able to view England through the eyes of such historians as John Fiske and Goldwin Smith.

3. History trains the student in the exercise of what may be called the reconstructive imagination, in that it

calls upon him to picture outgrown modes of thought and feeling, to construct images of old social customs, to imagine the influence of an economic, political, and social life almost totally different from that of the present. Reasoning always upon the basis of this image of old conditions the student is called upon to reconstruct the whole social consciousness of the people whom he is studying. He must be able to see, feel, and act with them, thus making himself for the time being a new personality. Assuming that the youth who thus reconstructs the past will want to imagine himself one of the leaders, he will be now an Egyptian priest or soldier; now a Greek freeman, landowner and noble, if not a philosopher; now a feudal lord or a mediæval church dignitary; or in modern times a Drake, a Napoleon, or a merchant prince. The play of fantasy involved in this change of personality gives great flexibility to the imagination of youth. It is a legitimate successor to the imagination of the child who is ready to 'play' any rôle his fancy suggests; and it is allied to the form involved in trying to live into the consciousness of a foreign nation through the study of their language. On the other hand, it differs radically from the forms of imagination involved in natural science and geometry, since they are constructive in a different sense.

4. The exercise of the memory in history takes on new forms because of the contingent nature of the causes. It is causal, or rational, to the extent to which events are

remembered through their causes, but the memory for the causes themselves often partakes of the mechanical, since they could not have been foreseen, but must simply be remembered. There is also room for a large amount of purely mechanical memory in this study, as every teacher who has prepared for an examination in history well knows. How to enable the student to secure the most lasting retention for the important events in history is an ever present problem to the teacher.

5. Finally, historical study should materially assist the student to develop his permanent attitude toward political liberty and self-government. If he is a member of a democratic society like our own, he will see not only the lasting good in democracy, but he will also see and in his measure be able to promote the conditions necessary for its successful continuance. With such an insight and disposition as history is able to give him, he will not be shaken by tempests in teapots, will not lose his faith in political freedom because some men remember their privileges and forget their responsibilities, but he will do his share in promoting public intelligence and arousing public conscience, thus like St. Paul, fighting the good fight and keeping the faith.

DISCUSSION: — 1. Which is more effective with high-school students, history treated as a science, or history treated as a literary art? 2. In what sense does history belong to æsthetics?

NOTE. — Mr. Charles Henry Firth in his "Plea for the Historical Teaching of History," London, 1904, says: "Men give opposite answers according to their conception of the methods and objects of the historian. One tells us that history is a science, nothing more and nothing less; another that it is an art and that one only succeeds in it by imagination. To me it seems to lie between these two extremes. History is neither, but it partakes of the nature of both."

C. THE ECONOMIC SCIENCES

GROUP VII

(1) *Economics*

83. Although economics as a science is not yet generally taught in high schools, the economic aspects of secondary education have become so numerous and important as to justify an economic group in the classification of studies.

Whenever society enters distinctively into a new phase of its evolution, there must be a new distribution of educational values. In a hundred years civilized society the world over has changed the whole tone of its existence. If it was once speculative and subjective, it is now scientific and objective; if once it was agricultural and rural, it is now industrial and urban. Speaking of our industrial evolution, Professor Dewey says: "The change that overshadows and even controls all others is the industrial one — the application of science resulting in the great inventions that have utilized the forces of nature on a vast and inexpensive scale; the growth of a world-wide market as the object of production, of vast manufacturing centres to supply this market, of cheap and rapid means

of communication and distribution between all its parts. Even as to its feebler beginnings, this change is not much more than a century old; in many of its most important aspects it falls within the short span of those now living. One can hardly believe there has been a revolution in all history so rapid, so extensive, and so complete."[1]

Fortunately for America, public and educational sentiment had been able to keep within reasonable distance of the stages of this industrial revolution, so that society is ready to utilize its best educational products in this new field, and the schools have been able in some degree at least to prepare the individual to devote his powers successfully to the new needs. Germany is an illustration of a land in which industrial progress has greatly outstripped educational development and social sentiment. The result is an "educated proletariat," to use Prince Bismarck's phrase, or, in other words, overproduction in the world of scholarship. Outside of a few great commercial centres, like Hamburg and Bremen, social sentiment does not permit an educated man to use his talents and learning for the promotion of industry, but dictates that he shall work in a learned profession or a civil office. With increasing industrial prosperity the higher schools and universities double their attendance every few years, while the possible places in official or professional life can but keep pace with the general increase of population. Here

[1] "School and Society," pp. 21–22.

we have an educational application of the famous Malthusian doctrine of the relation between food-supply and population. According to Russell,[1] to secure a permanent appointment as a teacher, a man must wait and work without salary on an average for a period of nearly six years (five or six years) after he has finished his university course. The "Associated Physicians of Germany" announce through the daily press that there are ten applicants for every position open in the medical profession. When it is remembered that not alone social prejudice, but also long years of highly specialized education, prevent a man trained in one field from successfully entering another, one can see how great a hardship it is to be confined to a calling in which the applicants outnumber ten to one the possible openings. Thanks, however, to our democratic sentiment, our readiness to fit our education to the needs of our students, and to the unrivalled opportunities opened to every variety of talent, we hardly know the meaning of the term *overproduction* as applied to educated men.

So imperative is the need of adjusting our education to our new industrial life, that President Eliot attempts a new definition of the cultivated man. In addition to the old concepts of what constitutes the cultivated man, he introduces some elements decidedly modern, as may be inferred from a few extracts from his address:—

[1] "German Higher Schools," p. 373.

"The rising generation should think hard, and feel keenly, just where the men and women who constitute the actual human world are thinking and feeling to-day.

"Combine the knowledge of literature with knowledge of the 'stream of the world,' and you have united two large sources of the influence of the cultivated person.

"Culture can no longer imply a knowledge of everything, not even a little knowledge of everything. It must be content with general knowledge of some things, and a real mastery of some small portion of the human store.

"The imagination is the greatest of human powers, no matter in what field it works — in art or literature, in mechanical invention, in science, government, commerce, or religion; and the training of the imagination is, therefore, far the most important part of education.

"That great century (the nineteenth) has taught us that, on the whole, the scientific imagination is quite as productive for human service as the literary or poetic imagination.

"Let us as teachers accept no single element or kind of culture as the one essential; let us remember that the best fruits of real culture are an open mind, broad sympathies, and respect for all the diverse achievements of the human intellect at whatever stage of development they may actually be — the stage of fresh discovery, or bold exploration, or complete conquest. Let us remember that the moral elements of the new education are individual

choice of studies and career among a great, new variety of studies and careers, early responsibility accompanying this freedom of choice, love of truth now that truth may be directly sought through rational inquiry, and an omnipotent sense of social obligation. Those moral elements are so strong that the new forms of culture are likely to prove themselves quite as productive of morality, high-mindedness, and idealism as the old." [1]

DISCUSSION: — 1. What hinders a rapid readjustment of education to modern conditions? 2. Is a fair degree of educational balance still possible and desirable in secondary education? (See paragraph 3 of President Eliot's definition.)

84. The theme of economics is the study of society from the standpoint of wealth, or material well-being. First, it investigates theoretically the laws and conditions of wealth production, while practically education in economics endeavors to prepare the citizen for efficient service in such production; this gives rise to manual training and other forms of industrial education. Again, economics investigates theoretically the laws and conditions of wealth exchange, while the school also tries to promote practical efficiency on the part of its students in effecting the exchange; this gives rise to schools and departments of commerce. Finally economics investigates the laws of consumption and the consequent stand-

[1] C. W. Eliot, "A New Definition of the Cultured Man," Proceedings N. E. A., 1903, pp. 46–54.

ard of life among the people, turning its attention to the burning question of the proper relation between the possibilities of earning and the cultural necessities for spending. Even if there is no special department of school education which trains to rational consumption, yet school economics should at least try to impart rational ideals regarding minimum standards of life, and the duty of society to raise them among the masses.

DISCUSSION: — 1. Is it wise to include elementary economics as a distinct study in any high-school course? in which? 2. Value to the teacher of a study of economics.

85. As explained in Section 30, the studies of the economic group may be regarded as compounds arising from the application of pure sciences to industrial or material welfare. Here we see the exact, the biological, and the earth sciences joining with history, modern foreign languages, anthropology, etc., to lay the foundations of industrial welfare, and to prepare the individual both on the side of insight and upon that of efficiency to play an honorable and useful part therein.

What was said under history as to using the powers of reason, imagination, and memory, upon that which is partly natural law and partly contingency, holds likewise of economics, with this difference: that whereas in history they apply to political evolution, the growth of mankind in civil liberty and self-government, in economics they

apply to the daily industrial life about us. History and economic theory determine political policy. With respect to the combination of the law-accordant and the contingent, the two departments give substantially the same mental training, preparing the man of the world for correct judgment in that realm of human affairs where it is necessary to apply scientific categories, but at the same time to allow for contingencies.

Economics, unlike history, abounds in generalizations, like Ricardo's law of rent, Malthus' law of population, the law of diminishing returns, etc., which are however more or less modified by the contingent. Thus, for example, few people are disturbed at present by the inexorable logic of the Malthusian doctrine, for commerce and invention are increasing food-supply faster than population advances, even with the aid of better economic and hygienic conditions. History searches out the causes immediate and remote for any given series of events, but it hesitates to lay down generalizations as to what will occur in the future. It is unexpected contingency, the unpredictable change of circumstances, that renders vain most attempts to judge the future by the past. Economics has, therefore, an element of educational value not found in history, for it teaches the youth to generalize in a new way, wherein contingency modifies, but does not wholly negate, the formulation of law and principle.

DISCUSSION: — 1. Importance of the economic aspects of studies as a preparation for American political life; 2. as a basis for business success. 3. Compare the generalizations of economics with those of physics, of biology.

2. *Economic Aspects of Other Studies*

86. It is only when we see what economic aspects of other studies and what economic technique are involved in some phases of modern secondary education, that we perceive the full need for separate classification of the economic group. The most important economic aspects of other studies are the following: —

1. Commercial geography.
2. Commercial history.
3. Commercial mathematics.
4. Economic physics, chemistry, and biology.
5. Modern foreign languages as commercial tools.
6. Mechanical drawing.

DISCUSSION: — Are these subjects in commercial and manual training courses an equivalent of the more general treatment of the same subjects in literary and scientific courses?

3. *Technique of Economics*

87. The technique of economics has had a remarkable development during the last twenty years, giving rise to new types of schools and causing not a little astonishment among that group of men who have not been able to adjust

their educational theories to the industrial situation. This technique as it appears in the high school naturally divides as follows: —

1. Technique pertaining to production:
   a. Manual training for boys.
   b. Cooking, sewing, designing, and other forms of industrial training for girls.
2. Technique pertaining to distribution:
   a. Bookkeeping.
   b. Banking and finance.
   c. Typewriting and stenography.
   d. Laboratory study of commercial products.

Since the educational significance of technique will form a special topic for later consideration, its further discussion at this point is unnecessary.

CHAPTER V

THE ORGANIZATION OF STUDIES INTO CURRICULA

1. The Twofold Aspect of all School Studies: Knowledge and Technique, or the Acquisition of Efficiency, in Use.

88. The preceding chapters have discussed the classification and relative educational worth of the studies as based on their content. Nothing has been said, however, as to how this worth is to be realized by the student. It is evident at a glance, first, that no one student is able profitably to pursue all these branches of study, since this is prevented by lack of time; and, second, that natural sequence and relative importance among the studies make it inadvisable for the student to pursue every study selected throughout his whole school course. We are consequently compelled first of all to set ourselves the problem of selecting suitable portions of the studies to be pursued, deciding when they shall be begun, in what order taken up, and how long they shall be studied. These appear simple matters, yet we shall find that our whole conception of education is involved in the decisions we make.

A distinction of fundamental importance in the making

of the curriculum, as well as in the whole process of teaching, is that between the acquisition of knowledge on the one hand and the acquisition of skill and efficiency in its application on the other. The latter is called *technique*. The thesis of this Section is, that we must recognize this twofold aspect in every study, and provide time in the curriculum and place in the school for the acquisition of both knowledge of its content and technique in its use.

The subject may be, and indeed in some cases has been, approached from diverse points of view, a few of which may be briefly mentioned.

1. The fundamental purposes for the acquisition of the technique of a study are two: (*a*) That the student may be able to apply his knowledge of the study readily and skilfully in those departments of practical life in which it may be found useful; (*b*) The reflex action that the acquisition of skill in the use of knowledge has upon the quality of the knowledge itself, since in the effort to attain skill in use, insight is deepened, memory rendered more secure, and interest strengthened.

2. Mental processes are arrested at an incomplete stage of development when insight only is sought, since cognition alone is emphasized, whereas the complete cycle of mental activity embraces cognition, feeling, or emotion (often in the form of interested attention) and that form of volitional action which consists of doing something. An idea that stops at cognition might perhaps be called *clear* and one

that completes the cycle above described *vivid.* A clear idea, or one that is arrested at the stage of cognition, may perhaps enlighten the understanding, but it does not warm the feelings or give scope to volitional action. We are inclined to think our work done when the student apperceives, but this is only the stage of clearness; if we would have him reach the stage of vividness, we must see that he acquires the necessary technique.

3. The modern psychologist emphasizes the reciprocal dependence of sensory and motor powers, showing that each is essential to the perfect development of the other. Consequently all school work should make provision not only for the sensory-intellectual in the apprehension of fact and law, but also for the intellectual-motor in the acquisition of that form of efficiency that we term technique. Professor James[1] recognizes the importance of this distinction when he exclaims, "No impression without expression!" By this he means that every sensory impression shall find its adequate expression not only through the vocal organs in speech or song, but also through the hand in writing, drawing, moulding, or in the use of tools, apparatus, and utensils. In other words ideas must not only be clear, but must also become vivid through the appropriate use of the motor system of the physical organism; we must have not knowledge alone, but also the skill that comes from its application.

[1] "Talks to Teachers," pp. 33–38.

4. Professor Dewey[1] emphasizes this same distinction under the terms *Content* and *Form.* To acquire the 'content' of a study we master the facts and laws which human experience and reflection have gathered and formulated. The content of a study is a social product to be transmitted to youth. To acquire the 'form' of a study we master the technique which enables us to use this social product in the society of which we are now, or are later to become, a part. The form of a study is a social instrumentality to be acquired by youth in order to make the content effective in practical life. Reciprocally, we gain insight in order to be efficient, and we train ourselves in efficiency that we may deepen the insight and realize its importance in the world. Pestalozzi said of his century: "The worst gift, perhaps, that an evil genius has made to our age is *knowledge without training in efficiency.*"

5. Finally, a truer, more adequate, and more organic formation of the curriculum can be made with than without this distinction; for, as shown in Section 78, if we confine the acquisition of skill to singing and drawing, thus making these exercises merely accessory and more or less incidental, we put into the course of study something that does not organically belong to it. Furthermore, such a conception of technique would wholly fail to account for

[1] "The Ethical Element in Education," Third Year-Book, National Herbart Society, p. 18.

modern developments of the curriculum as seen in manual training and commercial high schools. But when this distinction is recognized as of universal validity for all studies, and it is also seen that changing circumstances change the emphasis that is to be put now upon the one, now upon the other of these elements, the construction of different curricula from the same studies for different kinds of schools or different classes of students becomes, logically at least, easy and natural.[1]

DISCUSSION: — Extent to which this principle has been hitherto recognized.

89. Sometimes the acquisition of technique calls for a special place and equipment, sometimes it can be acquired without them. The natural sciences call for laboratory and field work, and usually for a special equipment of apparatus, as in physics and chemistry; manual training needs workshops, tools, and machines; commercial schools or courses demand laboratories, business offices, and the appliances used in communication. It would be a distinct gain in all secondary education if the workroom idea involved in the acquisition of technique could find adequate visible expression in laboratories, workshops, apparatus, and above all of *work desks* that are capable of easy transformation according to the use to which they are to be put. The same need is felt in the elementary

[1] See Outline, pp. 167–170.

school. Dewey, trying to find some school desks suitable for work, thus narrates his experience: "Some years ago I was looking about the school-supply stores in the city, trying to find desks and chairs which seemed thoroughly suitable from all points of view — artistic, hygienic, and educational. We had a good deal of difficulty in finding what we needed, and one dealer, more intelligent than the rest, made this remark, 'I am afraid we have not what you want. You want something at which the children may work; these are all for listening.' That tells the story of the traditional education."

90. In order to show how the study groups appear when this distinction between knowledge and technique is everywhere made, the following table is arranged: —

Twofold Aspect of all High-school Studies

Knowledge — Insight	Technique — Efficiency in Use
Group I	
1. *Mathematics*	
Intellectual grasp of fundamental conceptions and progressive mastery of the principles of algebra, geometry, and trigonometry.	Laboratory practice in solving problems by demonstration and graphic methods; application especially to problems connected with physics.

2. *Physics*

Insight derived from text-book, lecture, and experiment.	Laboratory practice for induction and verification.

3. *Chemistry*

Knowledge of the laws of chemical action derived through experiment, text-book, and lecture.	Laboratory practice for induction and verification, and analysis of compounds.

GROUP II

Biology

Knowledge of classification, morphology, anatomy, function, etc., in zoölogy, botany, and physiology.	Laboratory and field practice, in dissecting, gathering, classifying, etc., as well as in determining life-history and function. Physical training in and out of school.

GROUP III

The Earth Sciences

Knowledge of facts and insight into laws of mathematical and physical geography and geology.	Field and laboratory practice in observation, demonstration, relief moulding, recognition and classification of specimens, etc.

GROUP IV

1. *Ancient Languages*

Knowledge and appreciation of literary content and of grammatical and rhetorical principles.	Practical application of linguistic distinctions to text. Translation into English.

2. *Modern Foreign Languages*

Acquisition of the literary content of works read; comprehension of mental life of modern foreign peoples.	Drill in pronunciation, and use of words both in oral and written speech. Application of grammar so far as necessary for understanding and use of the language.

3. *English*

Appreciative mastery of literary content; also comprehension of grammatical and rhetorical principles.	Workroom practice in English composition; in dramatic representation, and the application of grammatical and rhetorical principles.

GROUP V

The Fine Arts

Æsthetic understanding and application of music, painting and drawing, sculpture and architecture, through contemplative study.	Acquisition of artistic technique through singing, playing on instruments, drawing, painting, moulding, decorative design, etc.

GROUP VI

History

Knowledge of political evolution through study of ancient, mediæval and modern, history. Study of the machinery of national and local self-government.	Exercise in methods of parliamentary procedure through literary and debating societies, congresses, clubs, athletic associations, etc. In some cases, practice in self-government, as in the school city, or in such institutions as the George Junior Republic.

GROUP VII

Economics

Insight into economic laws of production, distribution, and consumption; study of economic side of mathematics, natural sciences, and languages.

Technique of production as in mechanical drawing, designing, manual training, cooking, handicrafts, etc.

Technique of distribution as in accounts, stenography, typewriting, laboratory study of commercial products, commercial use of modern languages, etc.

90. It is interesting to note that by thus extending the workshop idea to all the studies, we bring education again into line with race experience, in which most learning has been obtained in connection with practice in field, shop, or public life. This perhaps helps to account for the growing interest of the young in their studies that is nearly always observed when there is muscular activity in laboratory, workroom, or machine shop.

Again, this arrangement restores healthful relations between mental and physical exertion. Were all our schoolrooms fitted with desks both for sitting and for standing, for writing and for tool work, at least of the lighter and cleaner kinds; also were the spirit of social coöperation encouraged among the students, and accompanied by the liberty of moving about for mutual conference and assistance, as is the case to some extent in natural

science laboratories and machine shops, the physical well-being of our students would almost take care of itself.

It is a general observation often accompanied with expressions of regret, that students in professional courses in higher institutions manifest far more zeal, enthusiasm, and diligence than those who are pursuing a course in general culture. Among the reasons for this state of things is the fact that professional education always has a strong objective side, as in moot courts, clinics, practice schools, machine shops, laboratories, etc., whereas general education is frequently confined to things of thought alone.

The one provides for a balance between insight and efficiency in use, whereas the other is inclined to confine its field of activity to insight alone. But if we consistently carry out the workshop idea in all studies, allowing no insight to be unaccompanied by the appropriate training in its technique, the greatest cause of apathy in culture courses will be removed.[1]

DISCUSSION: — 1. Extent to which the workshop idea may take the place of physical training. 2. Effect of laboratory work on school discipline. 3. Extent to which the laboratory and workshop practice is a legitimate field for specializing. 4. Intimacy of thought and laboratory and workshop practice

[1] For an illustration of how this can be accomplished in English Composition, see Buck, "Laboratory Method in Teaching English," Proceedings N. E. A., 1904, pp. 506–508.

as a condition for securing the educational value of the latter. 5. Relative importance of the laboratory practice in the various subjects in enhancing insight and retention.

2. Principles of Selection and Arrangement of Studies and Topics

92. To adjust education to the multiplication of studies on the one hand, and to the diversities of training demanded by modern society on the other, Germany has adopted two types of fixed courses of study for general or cultural education; one found in the *Gymnasium* and the other in the *Realgymnasium*. Other schools are provided which omit one or more of the last years from the full course. These courses are fixed by public authority and may not be changed except by the authority that made them. The aim of each of these schools is to give a rounded education, the chief difference being one of emphasis, since about the only difference in studies is that English may be substituted for Greek in all schools of the *Real* type.

One of the chief defects of this inelastic system is that in the attempt to get all types of studies into the curriculum and to give each study the amount of time necessary for good results, the student is overworked to such an extent that his sight is usually impaired, and not infrequently his health also. The number of fifty or fifty-five minute periods per week, even for six-year-old boys, ranges from 30 to 33. A second serious defect is that, outside of the

mere choice of a school, which is not often possible, no attention is paid to individual preference or fitness in the selection of the studies to be pursued, or to the amount of time that shall be devoted to a study that is found in the program. There stands the school with its single fixed course of study; the student is permitted only this alternative — to take it or to leave it.[1]

[1] The following from the report of Dr. Dunker, member of the Royal Prussian Industrial Commission of 1904, shows the evil effects of the inelastic course in Germany: "Shopwork, in accordance with a fundamental but often forgotten educational principle, rests upon the native instincts of the growing human being. Not every boy of approximately high-school age is inclined to scientific studies, but almost every boy has an instinctive desire to create with the hand something concrete and tangible. To direct and cultivate this instinct must be the task of a rational education. Now, the advocates of manual training have always emphasized the point that they desire, by means of this manual training, to attract to the middle school pupils that are not drawn to higher culture by literary interests. Such pupils, who are not in themselves bad or mentally deficient, but whose interest cannot be reached by a one-sided school, are found in all countries. With us they are kept in the higher, almost purely literary, school by the pressure of military privileges. Beginning with Quarta (about fourteen years of age), they embarrass the classes, vex the teachers, lower the standard of instruction, and therefore that of the entire school, become over-aged, and secure at best the military privilege of one year's army service (instead of two). If they turn out well in some vocation in later life it is in spite of the school, not because of the school. Very often, however, they enter upon practical life morose natures, without faith in themselves and their calling, without energy, without creative ardor, irritated against the school that failed to reach them. Of the best the school can give, of the desire for progress, of the yearning for more and higher things, they have not felt a breath; their culture has come to an end, but also for effective manual work they are spoiled."

The best American practice deviates from the German plan in two important particulars. In the first place, it provides many more courses of study from which the student may take his choice. The courses, moreover, differ widely not only as to the studies they contain, but also as to the time to be devoted to each branch. The second deviation from the German practice is, to give the student considerable latitude both in the choice of studies and in the length of time that shall be devoted to them. Some schools have even gone to the extent of making all studies elective, but this is not common.

DISCUSSION: — 1. Possibility and desirability of limiting American secondary education to two or three closely related courses of study. 2. Compare the second cycle of French high schools with the American and German curricula.[1]

93. If, however, the responsibility for the construction of a course of study is to be divided between the individual student and society as represented by parents and school officers, the question naturally arises : According to what principles shall this division take place; also what shall society prescribe; what shall the student be allowed to elect?

The answer to such questions depends upon one's conception of the leading purposes of secondary education for normal individuals. If it is decided that the purpose is

[1] See Appendices.

purely 'cultural,' then one must determine what studies conduce to this end, and prescribe them; or if they are too numerous for prescription, then must one prescribe some, and offer a choice among those that remain. If one decides that secondary education shall be governed by the extrance conditions for higher institutions, then the prescription is determined by the requirements. If, however, one refuses to be bound by inherited ideals, on the one hand, or by the entrance requirements of higher institutions, on the other, and declares that the first purpose of the secondary school is to make education general, in the sense that it trains the student in every type of mental action and introduces him to every typical form of social, political, and industrial life, as revealed by language, science, art, history, and economics; and if, in addition, one declares that secondary education is special and practical only as it trains every student to be efficient with the knowledge he has acquired; then it becomes fairly evident that the school must prescribe those typical forms of mental training that long experience, reënforced by the analysis of relative educational values, shows to be necessary to all-round insight and efficiency. In brief, the field for prescription is departments, groups, or types of study; that for election is specific studies within the prescribed groups. A similar problem arises also when we consider not only the *what* but the *how much*. These and other related problems are considered in detail in the following sections: —

1. *Prescription and Election of Studies*

94. To the youth, blessed with health, mental ability, and financial means, the secondary or cultural stage of education reduces itself finally to the acquisition of such knowledge and skill as will best prepare him for what Herbert Spencer calls "complete living," and must include what is fairly representative not only of those sciences that conduce to physical well-being and economic welfare, but also those sciences and arts that conduce to social survival in institutional life, as well as to personal happiness and development.

Since the school authorities as the representatives of civilization have not only the responsibility of knowing what should be transmitted to the new generation, but have also the duty of seeing that no important acquisition be lost, it might seem at first glance as if prescription of studies were the only rational course to be pursued. But further reflection shows that it is practically impossible to prescribe for any one youth the study of all the world's acquisition of science and art, so that the principle of division of labor is as necessary in learning as it is in earning. Furthermore, since natural personal differences in taste, ability, industry, and destination that always exist are greatly multiplied in a democracy, where the students come from every stratum of society and go into every species of the world's work, it is evident that a modern high-school administration should permit the exercise of a certain

amount of personal choice in the selection of studies and in the relative emphasis that shall be placed upon them.

The minimum of prescription is indicated by our study of relative educational values. No important field of knowledge must be overlooked; no essential type of mental training ignored. Following the order of our discussion of values, we see that the great types are the natural sciences, the humanities, and the economic studies. Of the first grand division mathematics, an exact science, and an evolutionary science are necessary to representative completeness of knowledge and mental training; of the second grand division, linguistics, literature, art, and history form the irreducible minimum; of the third or economic grand division, some mastery of economic theory and some manual training or some skill in using the machinery of exchange are the essentials. In small high schools it may be necessary to confine the whole course of study to these few representatives of general culture. The larger the teaching body, however, the more courses can be provided, and the larger the range of electives may be. The chief differences among courses of study such as classical, Latin-scientific, English, manual training, commercial, etc., will pertain first to the studies that shall be selected to represent the various groups, and second to the amount of time that shall be devoted to each. No course of study can be pronounced educationally complete unless it contains a representative from every study group; nor can any course, how-

ever complete in this respect, be considered efficient that does not give to each study the amount of time and attention necessary for effective mastery, both as to knowledge and as to skill.

The school is responsible for seeing that through the studies prescribed by authority and those elected by personal preference the student's secondary education shall be fairly complete both in range and quality. Some departments have been anticipated in the elementary schools and some find their culmination in college or university; both these facts must be taken into consideration in arranging the curricula for high schools.

DISCUSSION: — 1. Apply the principles stated in this section to the curricula of secondary education in Germany, France, and England. 2. The time element in making studies, languages, history, science, etc., educationally effective.

2. *Selection and Sequence of Topics. Educational Interpretation of the Theory of Recapitulation.*

95. This subject has been more extensively discussed in elementary than in secondary education.[1] The Ziller theory is briefly as follows: Education has first to do with a developing mind; and second with the cultural products of a civilization that has developed through many stages of historical progress. The mind of a child, in analogy with

[1] See First and Second Year-Books of the National Herbart Society; DeGarmo, "Herbart and the Herbartians," pp. 107–112; Hall, "Adolescence," Vol. II, Chapter XVI.

the physical embryo of an animal, recapitulates in a few years the slow evolution of the race, for just as the embryo of one of the higher animals in its unfolding is known to pass through all the essential stages of development manifested by lower orders, so the child in his mental development may be conceived to have passed through in a short space of time all the great culture epochs that have marked the race evolution. What follows from this supposed parallelism? For Ziller the conclusion, one may say the unproved assumption, that the culture material for the education of the child at any given stage in his mental development must be drawn from the culture products of the race when it was in the corresponding stage of evolution.

"It is obvious," says Rein, "that, if the two series — the historical, with its culture materials; and the personal with its manifold ideas, wishes, and desires — can be brought successfully and accurately into harmony with each other, one can undoubtedly get control of the pupil's interest, because by this means the psychological conditions would be best established.[1]" Extended efforts have been made by the Ziller wing of the Herbartian School of educational thought to carry this theory into practice, but it need not surprise us that an important educational procedure that is founded first on an analogy and then upon an assumption, should be as vigorously opposed as it is

[1] "Outline of Pedagogics," p. 96.

vigorously exploited. Many depreciate the force of the analogy, while others deny the validity of the assumption.

Ziller maintains that because race and individual stages of development are parallel, *therefore* the culture products of the race are the proper material for the instruction of the child when he is in a corresponding stage. This conclusion, argues Dewey,[1] is not legitimate; for it does not follow logically, while the experience that seems to confirm it can be better explained in another way. Granting the parallelism between individual and racial development, what is it that really corresponds? Not the content of knowledge as seen in culture products, for these may be valuable or worthless, appropriate or inappropriate, as the case may be, but rather the typical modes of reaction to stimulation. If the race has through long ages in the struggle for existence developed the hunting instinct, or the impulse to pursue agriculture or to use tools, we may perhaps expect to find strong traces of these instincts or impulses in children at the appropriate stages of their mental development. This explains, in the opinion of many, why all boys are likely to be particularly receptive to subject-matter or exercises that give mental or physical scope to these inherited tendencies, and it furnishes strong intimations to the teacher concerning the selection of subject-matter, and the training in technique necessary to make the knowledge effective.

[1] Second Year-Book, National Herbart Society, pp. 89–95.

It may further be pointed out that the plan of selecting material from the cultural products of a distant past ignores the value of the present environment in furnishing an apperceptive basis for all education. Is it not somewhat of a contradiction in educational practice to borrow one's subject-matter from ancient sources, while being compelled to rely upon the pupil's experience in a modern environment for its comprehension? Why is not a modern youth who knows about railroads, steamboats, and bridges, gunpowder, rapid-fire cannon, and repeating rifles with their small caliber and smokeless powder; balloons, field glasses, and telegraphy, in a better condition to understand a modern war, than he is to comprehend a Persian invasion of Greece or a campaign of Cæsar against the Gauls? All we have to do to enable the student to understand even the most complicated machinery of industry or institutional organization is first to point out clearly its purpose, and then to analyze the whole into its constituent elements. In this way, both apperception and knowledge to be apperceived come from the same environment. All that is valuable of past culture epochs, is incorporated as elements in the present culture epoch, and may easily be mastered, everything in its own good time.[1]

[1] The best extended exposition of the results of Herbartian thought in elementary education as amended and developed by American experience and common sense is found in the works of Dr. Charles A. McMurry upon the various studies of the curriculum: The Macmillan Co.

DISCUSSION: — Relative force of the argument for (*a*) the cultural products, (*b*) the modes of reaction to stimulus, (*c*) the present environment.

96. The application of the doctrine of individual recapitulation of race development to secondary education is most extensively made by President Hall in his monumental work on "Adolescence." A few extracts from President Hall's sketch of the ideal school[1] will give a concrete notion of how in his opinion education in the secondary stage should adjust itself to the adolescent nature of youth: —

"First of all, the drill and mechanism of the previous period must be gradually relaxed, and an appeal must be made to freedom and interest. Individuality must have a far longer tether. We must, and can, really teach nothing that does not appeal to interests deep enough to make it seem of almost supreme value in the world. Hence, there must be a wide range of elective study for those who continue at school.

"A conclusive and far-reaching principle is that at no other stage of life is the power to appreciate and apprehend so far ahead of the power to express. Hence we should let up on examinations; we should cast our bread upon the waters, knowing that it will be found after many days, because so sensitized is the soul now that nothing is lost.

[1] Hall, "The Ideal School as based on Child Study," Proceedings N. E. A., 1901, pp. 484–488.

Mental and moral teaching and influences sink at once too deep to be reproduced in examinations of the present type, without injury to both mind and will.

"The youth is all insight and receptivity; he has just entered the stage of apprenticeship to life; he has awakened to it as at a second birth, and has found all things new and glorious.

"The teacher's cue is now to graft the soul all over with buds and scions, and not to try to gather a harvest. The fundamentals of the soul, which are instinct and intuition, and not pure intellect, are now in season. We must lay new and larger foundations.

"The high school has lost its independence (is now a mere link in an educational chain), and of all stages and grades has least interest in the large problems of education; namely, what to teach and how, in order to develop the nascent periods during the teens and to save powers now new-born in most profusion, but sure to be atrophied or perverted if not studied with tact and federated with individual adaptation. — High-school teachers have abandoned all initiative, have renounced their birthright of interpreting and ministering to the needs of one stage of life. Their motto seems to be, *Non vitæ sed scholæ discimus.* — Noble ideals are gone; the independent function of the secondary stage of education is almost abandoned; and the pupil and teacher devote themselves to a routine of tasks in an artificial program imposed by

the will of others, and fitting, not for the world, but for college.

"The teacher must teach more, and know more; he must be a living fountain, not a stagnant pool. He should not be a dealer in desiccated, second-hand knowledge, a mere giver-out and hearer of lessons. That is the chief and humiliating difference between our secondary teachers and those abroad, who are mostly doctors of philosophy as they should be."

This is the voice of an American Rousseau, who would bud the juicy naval orange upon the sour stock of the rough lemon, who sees visions and dreams dreams, who brings all the resources of his knowledge and eloquence, far greater than those of the old Rousseau, to bear upon the teacher that he may understand and lead aright the fresh young life whose intellectual and moral unfolding is so largely intrusted to his guidance.

Liberally interpreted, the foregoing intimations drawn from the study of adolescent characteristics may be summarized as follows:—

1. The studies must be chosen from every field of knowledge that is important for life, for "The teacher's cue is now to graft the soul all over with buds and scions."

2. The youth shall have the opportunity to study those departments and phases of knowledge that most keenly awake his slumbering interests; hence (1) many elective studies, and (2) permission to gratify to the utmost his

interest for the striking, the novel, the mysterious, and the practically important. This second point is illustrated by President Hall's recommendations concerning high-school physics.[1] Physics, he thinks, should not be dry and formal, not mathematical and strictly scientific, as it is in the university, but concrete, thought- and interest-provoking, and elastic enough to permit the student, through a free use of the laboratory, to examine as far as he will and can, the impressive phenomena already enumerated, such as argon, liquid air, X-rays, telegraph, telephone, graphophone, telautograph, wireless telegraphy, dynamos and electric motors, high and low potentials, single and alternating currents, locomotives, automobile gasolene engines, steam turbines, telescope, microscope, prisms for spectrum analysis, etc. Physics is not to consist alone of these side excursions, but it is to whet and satisfy curiosity concerning them, and thus lead gradually to the resolution on the student's part to master the science that shows how to comprehend and use them. It is easy, here as everywhere else, to inoculate the young mind against that life interest in the subject which should dwell with it long after the student leaves the high school. He must not be left in the mental condition of the youth who refused to see an artistic exhibition of "Hamlet" on the stage, on the ground that he was sick of "Hamlet," having studied it in school and looked up all the references.

[1] "Adolescence," Vol. II, Chapter XII.

3. "The teacher must be a living fountain, not a stagnant pool." He must know more and teach better, not as the mere examiner, or the purveyor of canned goods, but as the inspiring guide, who, while he imparts one increment of knowledge and skill, whets the appetite for another.

DISCUSSION: — Compare the validity of these arguments with that of the considerations presented in Section 95.

3. *The Correlation of High-school Subject-matter*

97. The problem of the best possible correlation of studies, that is, their best arrangement as to juxtaposition and succession, is one that has a long history, and one which in the course of time has seen many solutions. When subjects were few and educational aims simple or single, the problem was of easy solution; but it has grown difficult as studies have increased in complexity and number, and as educational aims have become numerous or many-sided.

In this as in other fields the theories of Plato have played an important rôle. According to his thought, there are two worlds, a transcendent and a sensuous one. The transcendent world is the world of ideas; the sensible world is that of phenomena. These two worlds, though disparate, are so related that the phenomena of the sense world are the images or counterparts of the transcendent ideas of the unseen world, which in turn are the prototypes

of the sense images. It is the function of our *senses* to apprehend the phenomena; that of our *reason* to apprehend the ideas. Just as phenomena and ideas are disparate, that is, belong to distinct worlds, so sense and reason are likewise disparate, or of unlike nature, and need a mediator capable of bringing them into proper relations. This mediator Plato saw in mathematics, in that on the one hand mathematics has to do with things of sense in the calculation of magnitudes, and on the other, proceeds by the exercise of reason to investigate the eternal relations of things. Thus, for example, the relation of the hypothenuse to the legs of a right triangle has to do with a concrete instance of a particular triangle, and with an eternal law which has been and will be true throughout all the vast eons of time and in every nook and cranny of space, which, like the ideas themselves, must stand though the heavens fall. Since the Greek program consisted alone of language, mathematics, and philosophy, and since with Plato the final end of education was to produce the philosopher, the natural as well as the rational order of studies was (1) Language (especially poetry), (2) Mathematics (especially geometry), (3) Philosophy. This program is simple yet beautiful in its perfection, as may be seen in the following exposition:—

1. Language is empirical for it deals with words, sentences, and literary wholes. It proceeds through inductive study to rules. These are of many-sided application and

form the key to all knowledge. Poetry and prose literary masterpieces expand to take in the whole world of sensible perceptions.

2. Mathematics is a rational science mostly deductive in character and sets the demonstrative reason to work. Like poetry it is empirical and elementary in that it has to do with magnitudes that appeal to sense; but unlike poetry it leads to the comprehension of universal laws, and since mathematics is the science of the problem, it leads back again into the world of sense.

3. Philosophy, like mathematics, is rational and deductive. It gets small assistance, however, from the world of sense, while it demands the highest possible exercise of abstract thought.

The early Christian thinkers accepted in general Plato's philosophy, and with it his order of studies, which now took the following form:—

1. The trivium (speech—grammar, rhetoric, dialectics).

2. The quadrivium (mathematics—arithmetic, geometry, music, and astronomy).

3. Philosophy and theology.

Since their aim was to educate the priest, as Plato's was to develop the philosopher, the schoolmen had to take but one additional step, namely, theology, in order to complete their curriculum. They could therefore preserve the organic construction of Plato's course of study. The history of education shows how this unity devised by

the schoolmen was destroyed by the nominalists, the humanists, and the scientists. We shall in all probability never see its like again, for the old world has departed, and with it its unity of aim and its simplicity of subject-matter. Then but a single class of the population was to be educated, now all classes claim it as an inherent right of mankind; then a single aim was dominant, now the ends of education are manifold; then only a little teachable knowledge was available, now the labors of thousands for generations have increased the amount of teachable knowledge beyond the needs and capacities of any individual or class of individuals. Yet, for all that, the need for an organic course of study for every department of general education has not left the world; the problem is still with us, but it must have a new solution, or better, a number of new solutions.

DISCUSSION: — To what degree do the various curricula presented in the appendix approximate to Plato's scheme of correlation?

98. Herbart suggested that related topics should be taught simultaneously in order to extend and intensify all interests created. Ziller, following up this suggestion and uniting his theory of the historical stages of culture with his ethico-religious aim of education, devised an elaborate plan of what he called concentration of instruction. According to this scheme, the humanistic aspects

of the curriculum must take the lead and dominate all others, for two reasons; namely, they presumably have more ethical and religious value than the others, and they can be taught according to historical stages. Consequently the elementary curriculum, with which Ziller principally busied himself, consists of a core of history, biblical and secular, and literature. About this core, which progresses by parallel historical stages of the various topics, all the facts and laws of nature are attached by mere association, usually mechanical and far-fetched. Three results, Ziller thought, might be thereby effected:—

(1) The unity of psychical life in the child might be strengthened, since he would have to regard simultaneously and as related all the ideas imparted or generated by education; (2) all the interests aroused by instruction would be centralized, strengthened, and extended in every direction until they penetrated every department of knowledge; (3) everything taught in the curriculum would take on an ethico-religious aspect as though seen through colored glasses, and the moral and religious character of the child would presumably be brought to an ideal state of perfection.

For several rather obvious reasons Ziller's hopes have not been widely realized. In the first place, it has never been proved that psychological unity concerning discrete things is desirable. Why should we desire even to be in condition to think of everything when we think of

anything? To have a tendency to do so might be very uncomfortable, or even unsettling to one's peace of mind. The habit of not thinking of unrelated matters is certainly one of the negative blessings of life, which should not be lightly put in jeopardy by the schoolmaster. In the next place, it has not been proved that interest is strengthened by the diffusion involved in extending it in every direction. The strong interests in life are marked by concentration to a small group of closely related things; why should not the same be true in education? Finally, the development of moral character of good fibre is not a matter of such innocent simplicity as Ziller seems to assume. True piety is hardly engendered by a pious regard of things piously indifferent. No serious effort has ever been made to extend the Ziller theory of concentration to secondary education.

99. Another scheme of concentration for elementary education was proposed by the late Colonel Parker,[1] which was based upon the philosophical unity of knowledge. This naturally could not be a psychological concentration on the part of the child, for he is too immature either to perceive or, even if he could perceive, to appreciate such relations. Parker's scheme would have had much better chance of successful application, psychologically considered, in the college than in the elementary school. The subjects thus organized are mineralogy, geology, geogra-

[1] F. W. Parker, "Theory of Concentration."

phy, astronomy, biology, zoölogy, anthropology, and history — a list of names that reminds us of Herbert Spencer's plea for science in his "Education." Necessarily in such a plan the logical rather than the psychological principle of sequence comes to the front. This principle is effective for the young, however, only when the subject-matter thus organized is so simple that the logical arrangement is at the same time the best psychological one, as in Plato's scheme of poetry, mathematics, and philosophy.

DISCUSSION: — Extent to which the logical coincides with the psychological sequence in representative studies like mathematics, physics, history.

100. Modern attempts to find a single adequate principle of correlation among the studies themselves having apparently proved unsuccessful, the only remaining recourse on this side of the problem is to examine the various studies in detail in order to discover and utilize such natural relations as may be found to exist among them. The leading interrelations may, therefore, be taken up in detail.

1. **Mathematics.** Even if this subject has lost the commanding place it held in ancient educational systems as the mediator between the apprehensions of sense and the processes of reason, it still performs a similar function. It is the presupposition and necessary propædeutic for all departments of pure and applied quantitative science,

such as physics, astronomy, to some extent chemistry also, and all departments of engineering. It underlies the theory of music, and has indirect relations to drawing and the theory of the beautiful. "Æsthetics in a certain sense coincides with mathematics, the difference between the two sciences consisting in this: Mathematics concerns itself only with the rationality of time and space perceptions, whereas æsthetics considers also the effect of this rationality upon our sensibilities." [1]

Upon the psychical side it still has the same training power for the reason that it had in Plato's time. Every student who learns through the study of geometry what a demonstration really is, feels, as did Lincoln when he had read the first book of Euclid, that he now knows what proof is.

2. **Geography,— the where.** Herbart called geography the associating science. It has in its various aspects undoubtedly more relations to the other branches of the curriculum than any other study. Its intimate connection with history, which must always have a place in which to unfold, and whose contingencies depend in large measure upon geographical elements, like land structure, rivers, food-supply, weather, etc., has long been observed by schoolmen. As mathematical geography it is closely related to elementary astronomy; as physical geography,

[1] Zeifing, "Neue Lehre von den Proportionen des menschlichen Körpers."

to plant and animal life as described in botany and zoölogy; as commercial geography, to economic production and exchange. Even literature and art are not wholly independent of place, and hence have their geographical aspects.

3. **Philosophy.** Though not a subject of high-school study, philosophy is of great importance to the teacher in enabling him to perceive the intimacy of the interrelations that exist among the departments of high-school study. Ethics reveals the hierarchy of ends in education, as elsewhere, and psychology reveals the means for reaching them. Metaphysics undertakes to unify, or bring into relation to ultimate ends, all the various departments of human thought and action.

4. **History, — the when.** As an associating discipline, history is less elementary than geography and less abstract than philosophy. In some departments the *when* is important, as in literature and art; in science it is less important, for sciences reign in the world because of what they are, rather than because of what they were. Yet interest in the present stages of development can often be enhanced by reference to former stages. In some cases comprehension is assisted by historical study of the science, as in the case of the atomic theory in chemistry.

5. **Language.** Language has relation to all sciences, for it is the means of their expression. The study of language, to be of most importance and use as an asso-

ciating science, must everywhere deal with the things of nature and civilization. This is especially true of the literature to be read by the student.

6. **The Hand.** All those subjects are naturally associated which demand the skilful use of the hand in the mastery of their technique, as in the laboratory, the drawing room, and the workshop. This unites by a new bond the exact and the biological sciences, fine art and craftsmanship, drawing and the mechanic arts.

101. Dewey[1] makes a convincing argument to show that the only really adequate correlation of studies will come, not so much through the discovery of internal likenesses and equivalences, as through sincere effort to correlate the studies in the school with the life activities to which they relate. He thinks, moreover, that the connecting link between the insight of the school and the institutional and industrial life outside the school is the laboratory, drawing room, or workshop, because it is here that the student's thought finds its first life-conforming expression. But when all studies are seen in their relations to the life activities which they explain and for which they prepare, it is evident that each will find its natural relations to every other in the student's mind, and that without any soul-racking effort on the part of the teacher to find some universal law of thought gravitation which shall bind all together in a beautiful system.

[1] "School and Society," pp. 77–110.

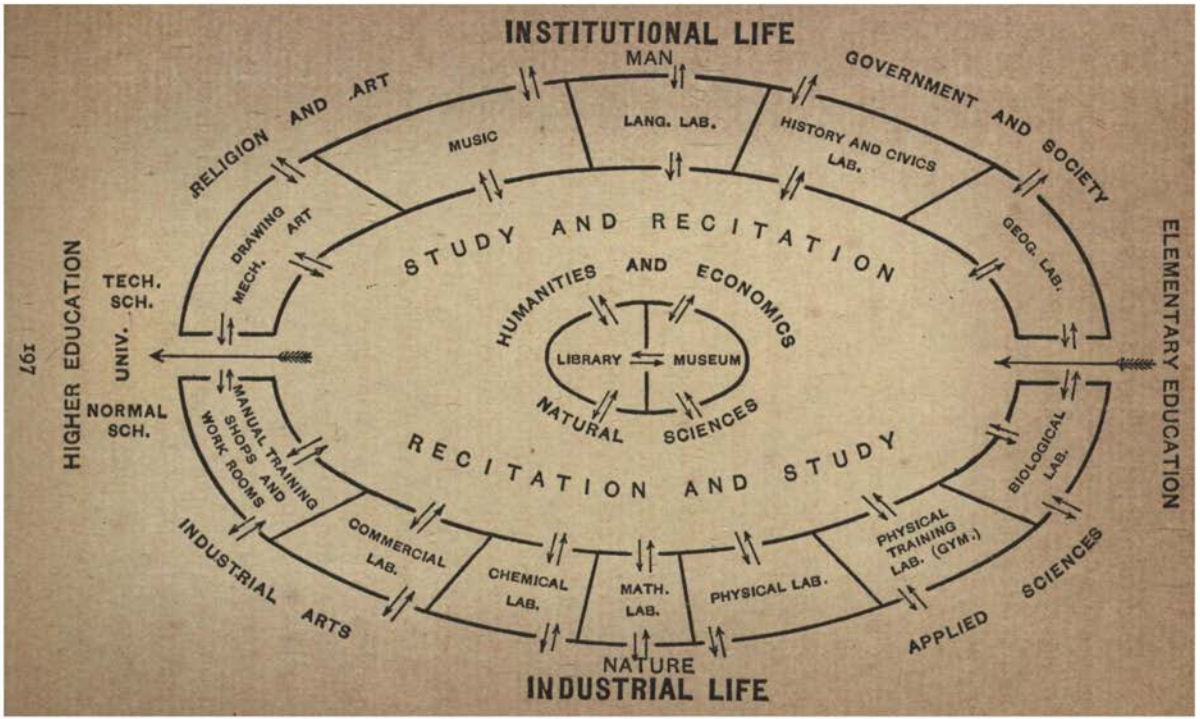
The accompanying diagram may serve to show at a glance how this idea works out in actual practice, and reënforces the recommendation already made that theory and practice, insight and efficiency, should go ever hand in hand.

DISCUSSION: — Extent to which the laboratory and workshop idea is: (*a*) desirable, (*b*) attainable, and (*c*) already attained.

4. *Practical Considerations in the Construction of Courses of Study*

102. In the making of a curriculum of study for actual use, theoretical considerations are nearly always modified by practical ones of tradition, public authority, and often mere feasibility as determined by financial support, material equipment or teaching force. The following exposition treats of a number of important topics from this standpoint: —

1. **Juxtaposition *vs.* Succession in the Arrangement of Studies.** Opinions of schoolmen as well as customs of countries differ as to what is the ideal program so far as the arrangement of studies in juxtaposition or succession is considered. In Germany, for instance, public authority decrees that many studies shall be carried on, side by side, for a series of years, a small number of hours per week on the average being given to each. During the four years corresponding most nearly to our high-school


INSTITUTIONAL LIFE
MAN
RELIGION AND ART
MUSIC
LANG. LAB.
GOVERNMENT AND SOCIETY
HISTORY AND CIVICS LAB.
DRAWING
MECH. ART
GEOG. LAB.
STUDY AND RECITATION
HUMANITIES AND ECONOMICS
LIBRARY
MUSEUM
NATURAL SCIENCES
HIGHER EDUCATION
TECH. SCH.
UNIV.
NORMAL SCH.
ELEMENTARY EDUCATION
RECITATION AND STUDY
MANUAL TRAINING SHOPS AND WORK ROOMS
COMMERCIAL LAB.
CHEMICAL LAB.
MATH. LAB.
PHYSICAL LAB.
PHYSICAL TRAINING LAB. (GYM.)
BIOLOGICAL LAB.
INDUSTRIAL ARTS
APPLIED SCIENCES
NATURE
INDUSTRIAL LIFE

course (III^b, III^a, II^b, II^a) the Prussian Realgymnasium always has as many as eleven subjects taught simultaneously, while in the third year twelve subjects are so taught.[1] In the Prussian classical Gymnasium, the first two years have eleven each, the third ten, and the fourth nine studies carried on together. The principle of succession is almost ignored in these schools, except within such related groups as mathematics and natural science. Religion, German, Latin, Greek, French, History and Geography combined as one subject, and gymnastics run through each of the four years without break. Mathematics is taught in them all; natural history in the first; and physics, chemistry, and mineralogy as one group through the remaining three. From three to five of these subjects get but two hours a week, three of them but three hours, one (Greek) has six hours, while Latin in the Gymnasium has seven hours for three years and six for one. In the Realgymnasium for the same time, Latin has four hours for each of the first two years and three for each of the last two years. Both of these courses are given in full in the appendix and may easily be compared.

To carry on so many studies at the same time, even though many of them get but two or three hours per week, it becomes necessary to hold the student for what seems to us an excessive number of hours per week, actually

[1] See Appendix.

from thirty to thirty-three or thirty-four in the Realgymnasium, and for the classical gymnasium approximately the same number. These periods are all from fifty to fifty-five minutes in length.

If the German plan may on the whole be described as that of juxtaposition, that of the American high school may lay claim to that of succession.[1]

The sample programs suggested by the Committee of Ten[2] have, as a rule, only five subjects under consideration at one time, or less than half the number of the German gymnasiums, while the number of periods per week is reduced from thirty-three to twenty, and the length of the periods from fifty or fifty-five to forty, forty-five or fifty minutes, the provision also being made that at least five of the twenty periods should be given to unprepared work.[3] In a few cases the number of studies to be carried on at one time rises to six.

The German courses appear, and are, in fact, far more rigorous in their demands upon the student than the American, though it must at once be explained that American high schools depend much more on preparation outside the recitation than do the German gymnasiums. In the latter schools a period is divided somewhat equally between advance work and recitation, the teacher fulfilling

[1] See Appendix.

[2] Report of Committee of Ten, pp. 46–47. See also Appendix.

[3] See Appendix.

in considerable degree the function performed by the text-book with us.

Professor Münch suggests two formulas for determining the relative amount of juxtaposition and succession, though admitting that these formulas are of small practical value: (1) "Put as many studies into juxtaposition as you can without encountering the danger that they will neutralize rather than organically supplement one another, or that interest will be dissipated; (2) put as many studies in succession as you can without danger of exhausting interest, or of banishing from consciousness what would otherwise be valuable." [1]

The inadequacy of such formulas may easily be seen by comparing their application in German and American courses of study. Evidently this is a point where custom is much more potent than argument. Those subjects will have to be placed in juxtaposition which are held to be absolutely essential in one or more of the four years of the course; all others will easily submit to the principle of succession, the hope being that an intensive study for a term or a year will prove more beneficial than more prolonged study with fewer periods per week and with more divided interest. Geography and history mutually supplement each other and may well be placed in close juxtaposition; the same is true for algebra and geometry, though the American plan inclines to algebra in the first,

[1] "Geist des Lehramts," p. 349.

and geometry in the second year of the high school course. Physics and chemistry may be taught at the same time, though for practical reasons, such as time for ample laboratory work, and preparation for advanced work in the university, American teachers of science think it better to teach them in different years. The Report of the Committee of Ten is almost unanimous in the judgment that physics should be taught in the last year of the high school, and chemistry in the next to the last.[1] The reason for placing physics at the end of the course is that the mathematics of the first three years forms a natural introduction to it. A similar reason places grammar before rhetoric.

DISCUSSION: — Relative weight of the advantages and disadvantages of the German as compared with the American plan regarding juxtaposition and succession, in respect to (*a*) health, (*b*) interest, (*c*) permanence of mastery, (*d*) time for laboratory or other similar exercises.

2. Importance of Inner Unity in Each Study or Study Group. The need of inner unity in the several branches of study becomes imperative as the number of subjects taken into the curriculum increases. When, for example, in the early American academies mathematics was confined mostly to arithmetic, it was perhaps natural that the subject should become unduly expanded by the inclusion of a multitude of topics now excluded or transferred to higher stages of the science, such as banking, insurance, discount,

[1] Report of the Committee of Ten, p. 117.

equation of payments, and others now more easily treated in algebra, to say nothing of the arithmetical 'puzzles' inserted to try the wits of the young student. Now, however, that we have, on the one hand, a nicely graduated course of mathematics, including not only arithmetic but also elementary and advanced algebra, plane and solid geometry, and plane and spherical trigonometry, all to be mastered by the time the youth is eighteen years of age, and, on the other, a similar development of the other studies, the old tendency to side excursions through the introduction of subsidiary and non-essential matter, must be resisted, and in the case of tradition vigorously combated, in order that each subject or group of subjects, through exclusion of unnecessary topics and the proper organization of the essentials, may fall into such organic unity that the student need lose no time and waste no energy.

The complete development of this theme, however, belongs to special didactics, and must be investigated through extended study in the several fields. Many valuable reports of special committees discuss this topic at length, as do the several excellent treatises on special branches of study now available for the secondary teacher.[1]

[1] Reports and special treatises:—

a. Report of the Committee of Ten.

b. Report of Committee on College Entrance Requirements, containing Reports of the following special committees: (1) Committee of Twelve of the American Philological Association of America; (2) Committee

3. **Provision for the Acquisition of Efficiency in the Use of Knowledge.** What has been termed expression, form, technique, skill, etc., or the intellectual-motor side of all education, demands especial attention in the construction of a course of study, since the older practices of the school obscure its importance, even when they do not entirely overlook its newer aspects, as seen in drawing, laboratory work, manual training, etc., and consequently fail to provide adequately for the necessary time and facilities. Modern experiments in manual training schools tend to confirm the opinion that half the time of the school day may be spent in laboratory, drawing room, and shop without essentially abridging the purely intellectual accomplishment of the older type of schools, and without exposing the student to the danger of overwork, since the alternation of intellectual and manual occupation furnishes a healthful balance of bodily and mental exertion. Should this opinion be ultimately fully confirmed, one can

of Twelve of the Modern Language Association; (3) Committee of Seven of the American Historical Association; (4) Committee of Chicago Section of the Mathematical Society; (5) also Report of Committees on Physical Geography, Chemistry, Botany, Zoölogy, and Physics.

c. The Macmillan series on the Teaching of Secondary Studies, Mathematics, English, etc.

d. The Longmans, Green & Co. series on the Teaching of Secondary Studies: Latin and Greek, History and Civics, English, Mathematics, etc.

e. For a German effort to bring unity into the several branches, see Dr. Frick's proposed curriculum for a classical gymnasium, in "Herbart and the Herbartians," pp. 187–202.

see what radical improvements on the side of the acquisition of efficiency are possible even in purely humanistic courses, for every humanistic branch of study may, with proper facilities and time allotment, have a species of laboratory or workshop drill that will promote at once efficiency in use and variety of work. But the full advantage of this position appears only when we regard the possibilities of technical training in every important field of education, whether the emphasis be placed upon language, science, or economics. No student of the humanities need be a stranger to the laboratory of science, or the workroom of the fine or useful arts; no student of science need be a stranger to the humanities; no student of the arts of production and exchange need be ignorant of language or science, for there is time for the development of insight and the acquisition of efficiency in all the typical fields of knowledge.

DISCUSSION: — Facilities, teaching force, daily program, etc., needed to realize the 'laboratory idea,' in classical, scientific, and industrial training.[1]

4. The Order in which Languages shall be taken Up. This is mostly fixed by custom in various schools and countries. Though from time to time the recommendation is made to place Greek before Latin, the consensus of opinion the world over is that Latin should come first. With

[1] See Outlines of Curricula in the Appendix.

regard to the priority of French or German in American schools, opinions differ. Some say that since French is more nearly allied to Latin than is German, it should be the language first begun; the argument can be made that for this very reason it should not come first, or perhaps at all, since modern education may be considered to have time enough for but one language of a kind. Furthermore, since we have a large number of German-speaking people in our population, it is easier to find teachers who can speak the German almost or quite as a mother tongue than it is to find teachers of French with like ability. In most schools this question is left an open one to be decided by the qualification of teachers, the wishes of parents, students, etc.

"Whether Latin or a modern language should come first in a well-ordered course of study is a question upon which teachers differ. It is one of the questions upon which, in the existing state of psychological and pedagogical science, it is just as well not to dogmatize. It is often urged that the discipline afforded by the study of Latin makes the subsequent learning of a modern language easier. This is true, but the converse is no less true."[1] Since Latin is not usually begun in American schools until the age of fourteen or fifteen, most educational bodies interested in language study recommend the beginning of

[1] Report of the Committee on College Entrance Requirements (Committee of Twelve of the Modern Language Association), pp. 98–99.

a modern foreign language in the grades at the age of eleven or twelve. In Germany, however, this question is a more burning one, for while the gymnasiums regularly begin Latin at the age of nine or ten, the 'Reform Gymnasium' at Frankfort a. M. pursues French for three years before beginning Latin, thus limiting the study of Latin to six years, instead of nine as in the older gymnasiums. This innovation is vigorously contested on all sorts of grounds, lest it undermine in a measure the character of German classical education.[1]

The further consideration of the early introduction of modern foreign languages under American conditions may well be postponed until the proposition for a six-years' high-school course is discussed.

DISCUSSION: — 1. Herbart's reasons for recommending that Greek precede Latin.[2] 2. Advantages that are expected from studying French for three years before Latin is begun, as seen in the German Reform Schools.[3]

5. *Types of Curricula*

103. Owing to causes already sufficiently explained, the abundant subject-matter of secondary education falls naturally into several types of curricula, in order to meet the varied needs of a democratic society. So distinctive in character are some of these curricula that in large cities

[1] Russell, "German Higher Schools," pp. 399–405.

[2] Herbart, "Outlines of Educational Doctrine," pp. 282–284.

[3] Russell, "German Higher Schools," pp. 399–405.

they often rise to separate schools. In general, however, several types of curricula appear in the same high school under the name of courses of study. It is possible to arrange a course of study for each student; this is often done in special cases, and is even attempted for all students in some schools. Obviously, however, such a precedure involves much labor and is especially liable to error, either on the part of the teacher who prescribes, or on that of the student who chooses. Students fall naturally into classes, such as those who are fitting for college, or those who are well adapted to profit by certain types of study. On the basis of this natural division in the wishes or abilities of the students it is possible to formulate courses of study, liberal and relatively complete in character, which will answer to the several needs of the students. If further flexibility is desired, electives from among fairly equivalent studies may be offered in the later years of each course.

The construction of these courses of study is often left to custom or the individual opinion of the principal or the superintendent who formulates them. The school officer, however, who wishes to proceed with some degree of scientific accuracy, must apply the principles explained above in the present chapter to at least five important points: —

1. What studies shall be chosen for each course? On the basis of a study of educational values and equivalences, it has been recommended that each distinctive type or group of studies be represented in each high-school course,

the degree of representation being governed by the size and qualifications of the teaching corps, also by the general character of the course itself.

2. How much time shall be devoted to each study chosen; *i.e.*, for how many periods per week; for how many terms or years shall it be taught? No absolute principle can be established to govern this matter. The consensus of our best educational opinion, however, is to the effect that to get the full educational value from a subject it must be taught with considerable intensity for a considerable length of time. Some subjects like languages and mathematics must be continued for a series of years; others may be disposed of in briefer periods. The minimum for effective work in any branch is thought to be four or five periods per week for a half year.

3. What shall be the content of the subjects chosen? Here again cumulative experience is the best guide. Fortunately, we have a number of trustworthy formulations of such experience in American schools. The first in importance is the Report of the Committee of Ten of the National Educational Association,[1] with its nine subcommittees of ten each. The second is the Report of the Committee on College Entrance Requirements of the N. E. A.[2]

[1] Report of the Committee of Ten, N. E. A., published by the American Book Co., New York, Chicago, and Cincinnati.

[2] Published by the Association, Irwin Shepard, secretary, Winona, Minn.

Other important reports in this field are those issued by the college entrance examination Board of the Middle States and Maryland,[1] the New York State Academic Syllabus, renewed every five years and issued by the Education Department of the State, and the numerous reports of committees of educational associations throughout the country, to be found in the files of the *School Review*, which is published at the university of Chicago. All of these reports are national in scope, and worthy the most careful study.

DISCUSSION: — Comparison of the various curricula given in the Appendices with respect to the points discussed above.

4. What shall be prescribed and what elective in each course? The principles that should govern here have been explained above in Section 94.

5. How many recitation periods per week shall be required of each student? The Committee of Ten suggest a uniform requirement of twenty, but they take no account of extra time needed for music, drawing, and other forms of manual work. The European systems uniformly make much larger demands. President Butler[2] would hold the student to a minimum of twenty-five full hours of educative work per week. Unless the stamina of American youth is much below that of European, this cannot be held to be an excessive re-

[1] See Annual Report in the *Educational Review*.

[2] "The Meaning of Education," p. 157.

quirement. When laboratory work is included, it is certainly not excessive.

The names in most common use for the several courses are as follows: —

(1) *Classical:* three foreign languages, one modern.

(2) *Latin-Scientific:* two foreign languages, one modern.

(3) *Modern Language:* two foreign languages, both modern.

(4) *English:* one foreign language, ancient or modern.

(5) *Manual Training:* any one or two foreign languages, usually modern.

(6) *Commercial:* usually at least two modern foreign languages.

The first four of the above courses take their names from the languages taught in them; the last two from the leading characteristics of the courses themselves.

Discussion: — Consideration of the types of curricula given in the Appendices.

6. *A Six-Year High-School Course of Study*

104. Resolution IV of the Report of the Committee on College Entrance Requirements[1] reads as follows: *Re-*

[1] P. 30; see also Coy, "A Readjustment of the High-School Curriculum," Proceedings N. E. A., 1903, p. 177; also Hanus, "A Modern School," pp. 99–109.

solved, That we favor a unified six-year high-school course of study beginning with the seventh grade.

This implies either that the twelve years now devoted to elementary and higher education together (elementary school, 8 years; high school, 4 years) shall be so divided that secondary education shall occupy six years, and elementary education six years; or that the beginnings of some secondary school studies shall start in the last two years of the grammar school. The latter is what is recommended by the Committee, but the former has been proposed as a principle. In Europe generally the elementary are so distinct from the secondary schools that there is but little transition from one to the other, there being no common educational ladder for all classes of the population. Under these circumstances, the elementary schools begin at the age of six years and continue to that of fourteen, whereas the secondary schools begin at the age of nine or ten and close at the age of eighteen or nineteen. Much of the enviable superiority of these schools is due to the fact that real secondary studies, especially languages and mathematics, may be begun very early, and continue unbroken throughout the nine years' course. Having an educational ladder running through all our elementary and educational system, however, it is evident that we cannot copy the European plan, even were we on other grounds disposed to do so. Yet the extension downward of our secondary period, at least for important subjects demanding much

time, is highly desirable in public education. Some of the more prominent reasons for this change may be briefly mentioned: —

1. Such a plan would prevent the undue prolongation of strictly elementary methods, thus conducing to greater intellectual independence and efficiency. English boys take their plunge into Euclid's geometry at the age of eleven or twelve, some three or four years before American boys are supposed to be mature enough to make the attempt. In manners American boys are reputed to be more precocious than their English cousins; — why their prolonged infancy in intellectual capacity?

2. The proposed change in the kind of instruction in certain subjects corresponds closely to the physical and mental changes at the beginning of adolescence. In this case six years would be given to the mastery of the elementary arts, while the next six years could put the emphasis upon studies which provide at once for culture and for efficiency in life.

3. Such a plan would enable students to prepare more efficiently and with less nervous strain for more extended courses in college, professional or technical schools. Four years is too short a time for grounding the student in mathematics, languages, science, history, and the other studies demanded for entrance to higher institutions.

4. As Professor Hanus suggests, this arrangement

would make it practicable to introduce industrial training during the last two years of the grammar school for those who were not going into the high school; and to do the same on a higher plane during the last two years of the high school for those who did not propose to enter any higher institution of learning.

5. This plan harmonizes with the experience of foreign countries and the practice of our own private schools. A good private school can easily prepare a boy for college in from one to two years less than are required in a public high school, provided he begins his secondary studies by the time he is eleven or twelve years of age.

The obstacles in the way of such a movement are chiefly of two kinds, first, those of administration and equipment, and second, lack of adequately trained teachers. Neither of these is insuperable. A difficulty, though hardly an obstacle, is the need of preserving the regular four years' high-school courses for those who for one reason or another begin no secondary subjects in the grammar school. The Committee of Twelve of the American Philological Association[1] suggests that the Latin of the seventh and eighth grades be made an equivalent of the ordinary first year's work in Latin in the high school. Students who have had these two preparatory years' work would join the second Latin class in the high school and continue with them to the end of the course. A similar arrangement

[1] Report of the Committee on College Entrance Requirements, p. 72.

could be made for French and German;[1] for mathematics too, should American boys prove as capable in intellect as they are mature in feeling.

DISCUSSION: — Which shall be the ideal of the American high school: a complete general education fitting directly for all higher professional institutions, or as at present an incomplete general education, to be finished by a few years in college or university?

[1] See Report of Committee of Ten in Appendix.

APPENDIX A

TABLES FROM THE REPORT OF THE COMMITTEE OF TEN

TABLE I

SHOWING ARTICULATION OF ELEMENTARY AND SECONDARY SCHOOLS WITH DEMANDS OF EACH CONFERENCE

	ELEMENTARY GRADES. — PRIMARY AND GRAMMAR SCHOOL								SECONDARY SCHOOL. — HIGH SCHOOL OR ACADEMY			
SUBJECT	1st Year Age, 6–7	2d Year 7–8	3d Year 8–9	4th Year 9–10	5th Year 10–11	6th Year 11–12	7th Year 12–13	8th Year 13–14	9th Year 14–15	10th Year 15–16	11th Year 16–17	12th Year 17–18
1. LATIN					Reasons given for beginning Latin earlier than is now the custom.				5 p. a wk.	5 p. a wk.	5 p. a wk.	5 p. a wk.
2. GREEK							Latin to be begun a year before Greek.			5 p. a wk.	4 p. a wk.	5 p. a wk.
3. ENGLISH	Pupils to reproduce orally stories told them, to invent stories and describe objects.		Supplementary reading begun — and continued through all the grades. Composition begun — writing narratives and descriptions — oral and written exercises on forms and the sentence.				From this grade no reader to be used.	Grammar, 3 p. a wk.	Literature, 3 p. a wk. Composition, 2 p. a wk.	Literature, 3 p. a wk. Composition, 2 p. a wk.	Literature, 3 p. a wk. Composition, 1 p. a wk. Rhetoric, 1 p. a wk.	Literature, 3 p. a wk. Composition, 1 p. a wk. Grammar, 1 p. a wk.
4. MODERN LANGUAGES					Elective German or French, 5 p. a wk.	Elective German or French, 4 p. a wk.	Elective German or French, 3 p. a wk. at least.	Elective German or French, 3 p. a wk. at least.	The language begun below, 4 p. a wk.	The same language 4 p. a wk. Second language, 4 p. a wk.	The same language, 4 p. a wk. Second language, 4 p. a wk.	The same language, 4 p. a wk. Second language, 4 p. a wk.

	Elementary Grades. — Primary and Grammar School								Secondary School. — High School or Academy			
Subject	1st Year Age, 6–7	2d Year 7–8	3d Year 8–9	4th Year 9–10	5th Year 10–11	6th Year 11–12	7th Year 12–13	8th Year 13–14	9th Year 14–15	10th Year 15–16	11th Year 16–17	12th Year 17–18
5. Mathematics	Arithmetic during first eight years, with algebraic expressions and symbols and simple equations — no specific number of hours being recommended.				Concrete Geometry, 1 p. a wk.	Concrete Geometry, 1 p. a wk.	Concrete Geometry, 1 p. a wk.	Concrete Geometry, 1 p. a wk.	Algebra, 5 p. a wk.	Algebra *or* Bookkeeping and Commercial Arithmetic, 2½ p. a wk. Geometry, 2½ p. a wk.	Algebra *or* Bookkeeping and Commercial Arithmetic, 2½ p. a wk. Geometry, 2½ p. a wk.	Trigonometry and higher Algebra for candidates for scientific schools.
6. Physics, Chemistry, and Astronomy	Study of natural phenomena 5 p. a wk. through first eight years by experiments, including physical measurements and the recommendations of Conferences 7 and 9.								Elective Astronomy, 5 p. a wk., 12 wks.		Chemistry, 5 p. a wk.	Physics, 5 p. a wk.
7. Nat. History	Through first eight years 2 p. a wk., of not less than 30 minutes each, devoted to plants and animals; the instruction to be correlated with language, drawing, literature, and geography.								One yr. (which yr. not specified) 5 p. a wk. for botany or zoölogy. Half-yr. (late in course) anatomy, physiology, and hygiene, 5 p. a wk.			
8. History					Biography & mythology, 3 p. a wk.	American History and elements of civil government, 3 p. a wk.	Greek and Roman History, 3 p. a wk.		French History 3 p. a wk.	English History, 3 p. a wk.	American History, 3 p. a wk.	A special period intensively, and civil government, 3 p. a wk.
9. Geography	Time allotted in first eight years to equal that given to number work. The subject — the earth, its environment and inhabitants, including the elements of astronomy, meteorology, zoölogy, botany, history, commerce, races, religions, and governments.							Physical Geography.	(Physiography, geology, or meteorology at some part of the high school course. Possibly more than one of these where election is allowed.)		Elective Meteorology ½ this year or next.	Elective geology or physiography, ½ yr.

Abbreviations: p. = a recitation period of 40–45 minutes; wk. = week; yr. = year.

Table II exhibits the total amount of instruction (estimated) by the number of weekly periods assigned to each subject to be given in a secondary school during each year of a four-years' course on the supposition that the recommendations of the Conferences are all carried out.

TABLE II

FROM THE REPORT OF THE COMMITTEE OF TEN

1ST SECONDARY SCHOOL YEAR		2D SECONDARY SCHOOL YEAR	
Latin	5 p.	Latin	5 p.
English Literature, 3 p. " Composition, 2 p.	5 p.	Greek	5 p.
German or French		English Literature, 3 p. " Composition, 2 p.	5 p.
Algebra	4 p.	German	4 p.
History	5 p.	French	4 p.
	3 p.	Algebra,[1] 2½ p. Geometry, 2½ p.	5 p.
	22 p.	Astronomy (12 weeks)	5 p.
		Botany or Zoölogy	5 p.
		History	3 p.
			37½ p.
		[1] Option of bookkeeping and commercial arithmetic.	

3D SECONDARY SCHOOL YEAR		4TH SECONDARY SCHOOL YEAR	
Latin	5 p.	Latin	5 p.
Greek	4 p.	Greek	4 p.
English Literature, 3 p. " Composition, 1 p. Rhetoric, 1 p.	5 p.	English Literature, 3 p. " Composition, 1 p. " Grammar, 1 p.	5 p.
German	4 p.	German	4 p.
French	4 p.	French	4 p.
Algebra [1]	2½ p.	Trigonometry, 2 p. ½ yr. Higher Algebra, 2 p. ½ yr.	2 p.
Geometry	2½ p.	Physics	5 p.
Chemistry	5 p.	Anatomy, Physiology, and Hygiene, ½ yr.	5 p.
History	3 p	History	3 p.
	35 p.	Geology or Physiography, 3 p. ½ yr. Meteorology, 3 p. ½ yr.	3 p.
			37½ p.
[1] Option of bookkeeping and commercial arithmetic.			

TABLE III

FROM THE REPORT OF THE COMMITTEE OF TEN

1ST SECONDARY SCHOOL YEAR		2D SECONDARY SCHOOL YEAR	
Latin	5 p.	Latin	4 p.
English Literature, 2 p. / " Composition, 2 p.	4 p.	Greek	5 p.
German [or French]	5 p.	English Literature, 2 p. / " Composition, 2 p.	4 p.
Algebra	4 p.	German, continued	4 p.
History of Italy, Spain, and France	3 p.	French, begun	5 p.
Applied Geography (European political — continental and oceanic flora and fauna)	4 p.	Algebra,[1] 2 p. / Geometry, 2 p.	4 p.
	25 p.	Botany or Zoölogy	4 p.
		English History to 1688	3 p.
			33 p.
		[1] Option of bookkeeping and commercial arithmetic.	
3D SECONDARY SCHOOL YEAR		4TH SECONDARY SCHOOL YEAR	
Latin	4 p.	Latin	4 p.
Greek	4 p.	Greek	4 p.
English Literature, 2 p. / " Composition, 1 p. / Rhetoric, 1 p.	4 p.	English Literature, 2 p. / " Composition, 1 p. / " Grammar, 1 p.	4 p.
German	4 p.	German	4 p.
French	4 p.	French / Trigonometry / Higher Algebra	2 p.
Algebra,[1] 2 p. / Geometry, 2 p.	4 p.	Chemistry	4 p.
Physics	4 p.	History (intensive) and Civil Government	3 p.
History, English and American	3 p.	Geology or Physiography, 4 p. 1st ½ yr. / Anatomy, Physiology, and Hygiene, 4 p. 2d ½ yr.	4 p.
Astronomy, 3 p. 1st ½ yr. / Meteorology, 3 p. 2d ½ yr.	3 p.		
	34 p.		33 p.
[1] Option of bookkeeping and commercial arithmetic.			

The adoption of the number four as the standard number of weekly periods will not make it impossible to carry into effect

the fundamental conception of all the Conferences; namely, that all the subjects which make part of the secondary school course should be taught consecutively enough and extensively enough to make every subject yield that training which it is best fitted to yield, — provided that the proposed correlation and association of subjects are carried out in practice. With regard to the arrangement or sequence of subjects, the Committee follow in this table the recommendations of the Conferences with only slight modifications. They insert in the first year applied geography, using the term in the sense in which it is used by the Conference on Geography; and they make this insertion in order that natural science may be represented in the program of that year, and that a complete break of continuity, as regards science subjects, between the eighth grade and the second year of the secondary school may be avoided. They have felt obliged to put physics into the third year, and chemistry into the fourth, in order that the subject of physics may precede meteorology and physiography; and they have slightly increased the number of lessons in astronomy. With regard to the proportions of school time to be devoted to the different subjects, Table III. reduces somewhat the proportional time devoted to Latin, English, and mathematics, and increases the proportional time to be devoted to natural science. In a secondary school which teaches all the subjects recommended by the Conferences, and to the extent contemplated in Table III., nearly one-fifth of the whole instruction given will be devoted to natural science.

The Committee regard Table III not, of course, as a feasible program, but as the possible source of a great variety of good secondary school programs. It would be difficult to make a bad program out of the materials contained in this table, unless indeed the fundamental principles advocated by the Conferences should be neglected. With some reference to Table I, excellent six years' and five years' programs for

secondary schools can readily be constructed by spreading the subjects contained in Table III over six or five years instead of four, — of course with some changes in the time-allotment.

TABLE IV

FROM THE REPORT OF THE COMMITTEE OF TEN: SPECIMEN PROGRAMS

YEAR	CLASSICAL Three foreign languages (one modern).	LATIN-SCIENTIFIC Two foreign languages (one modern).
I	Latin ..... 5 p. English ..... 4 p. Algebra ..... 4 p. History ..... 4 p. Physical Geography ..... 3 p. 20 p.	Latin ..... 5 p. English ..... 4 p. Algebra ..... 4 p. History ..... 4 p. Physical Geography ..... 3 p. 20 p.
II	Latin ..... 5 p. English ..... 2 p. [1] German [*or* French] begun ..... 4 p. Geometry ..... 3 p. Physics ..... 3 p. History ..... 3 p. 20 p.	Latin ..... 5 p. English ..... 2 p. German [*or* French] begun ..... 4 p. Geometry ..... 3 p. Physics ..... 3 p. Botany or Zoölogy ..... 3 p. 20 p.
III	Latin ..... 4 p. [1] Greek ..... 5 p. English ..... 3 p. German [*or* French] ..... 4 p. Mathematics { Algebra 2 / Geometry 2 } .... 4 p. 20 p.	Latin ..... 4 p. English ..... 3 p. German [*or* French] ..... 4 p. Mathematics { Algebra 2 / Geometry 2 } ... 4 p. Astronomy ½ yr. & Meteorology ½ yr. 3 p. History ..... 2 p. 20 p.
IV	Latin ..... 4 p. Greek ..... 5 p. English ..... 2 p. German [*or* French] ..... 3 p. Chemistry ..... 3 p. Trigonometry & Higher Algebra *or* History ..... 3 p. 20 p.	Latin ..... 4 p. English { as in Classical 2 / additional 2 } ..... 4 p. German [*or* French] ..... 3 p. Chemistry ..... 3 p. Trigonometry & Higher Algebra *or* History ..... 3 p. Geology or Physiography .. ½ yr. and Anatomy, Physiology, & Hygiene ..... ½ yr. 3 p. 20 p.

[1] In any school in which Greek can be better taught than a modern language, or in which local public opinion or the history of the school makes it desirable to teach Greek in an ample way, Greek may be substituted for German or French in the second year of the Classical program.

Year	Modern Languages Two foreign languages (both modern).	English One foreign language (ancient or modern).
I	French [*or* German] begun..... 5 p. English..... 4 p. Algebra..... 4 p. History..... 4 p. Physical Geography..... 3 p. 20 p.	Latin, or German, or French..... 5 p. English..... 4 p. Algebra..... 4 p. History..... 4 p. Physical Geography..... 3 p. 20 p.
II	French [*or* German]..... 4 p. English..... 2 p. German [*or* French] begun..... 5 p. Geometry..... 3 p. Physics..... 3 p. Botany or Zoölogy..... 3 p. 20 p.	Latin, or German, or French..5 or 4 p. English.....3 or 4 p. Geometry..... 3 p. Physics..... 3 p. History..... 3 p Botany or Zoölogy..... 3 p. 20 p.
III	French [*or* German]..... 4 p. English..... 3 p. German [*or* French]..... 4 p. Mathematics { Algebra 2 / Geometry 2 } ... 4 p. Astronomy ½ yr. & Meteorology ½ yr..... 3 p. History..... 2 p. 20 p.	Latin, or German, or French..... 4 p. English { as in others 3 / additional 2 } ..... 5 p. Mathematics { Algebra 2 / Geometry 2 } ..... 4 p. Astronomy ½ yr. & Meteorology ½ yr..... 3 p. History { as in the Latin-Scientific ..... 2 / additional ..... 2 } 4 p. 20 p.
IV	French [*or* German]..... 3 p. English { as in Classical 2 / additional 2 } ..... 4 p. German [*or* French]..... 4 p. Chemistry..... 3 p. Trigonometry & Higher Algebra 3 ..... / *or* / History ..... } 3 p. Geology or Physiography ½ yr. and Anatomy, Physiology, & Hygiene .....½ yr. } 3 p. 20 p.	Latin, or German, or French..... 4 p. English { as in Classical 2 / additional 2 } ..... 4 p. Chemistry..... 3 p. Trigonometry & Higher Algebra.. 3 p. History..... 3 p. Geology or Physiography ½ yr. and Anatomy, Physiology, & Hygiene.....½ yr. } 3 p. 20 p.

The omission of music, drawing, and elocution from the programs offered by the Committee was not intended to imply that these subjects ought to receive no systematic attention. It was merely thought best to leave it to local school

authorities to determine, without suggestions from the Committee, how these subjects should be introduced into the programs in addition to the subjects reported on by the Conferences.

APPENDIX B

TYPICAL AMERICAN HIGH-SCHOOL PROGRAMS

I. BOSTON HIGH-SCHOOL COURSE OF STUDY

First Year

Prescribed Studies

Physical Training. (Two points.)
Hygiene. (One point.)
Choral Practice. (One point.)
English I. (Five points.) English and American authors, grammar, composition, reading, speaking and debating.
One of the following. (Four or five points.)
(*a*) Algebra I, including quadratic equations, *or*
(*b*) Bookkeeping I, including commercial arithmetic, penmanship and commercial forms, *or*
(*c*) A foreign language (Latin I, French I, or German I).

Elective Studies

History I. Ancient History to the Fall of the Western Roman Empire.
Biology I. Botany and Zoölogy, or either.
Manual Training I.
Drawing I.
Music I. (Two points only.) Harmony.

Any subject in the prescribed list in any year may be chosen as an elective in that year.

Second Year

Prescribed Studies

Physical Training. (Two points.)
Hygiene. (See introduction 4.)

Choral Practice. (One point.)
English II. (Four or five points.) Continuation of English I.

Elective Studies

History II. Mediæval and early Modern History to A.D. 1700.
Mathematics II.
(*a*) Algebra II, *or*
(*b*) Algebra and Plane Geometry, *or*
(*c*) Plane Geometry.
Greek I.
Latin II.
French II.
German II.
Spanish I.
Biology II. Botany and Zoölogy, or either.
Physics I.
Manual Training II.
Drawing II.
Music II. (Two points only.) Elementary harmonic analysis, form.
Bookkeeping II.
Phonography and Typewriting I.
Commercial Geography.
Any study in the first year's list not already taken or successfully completed may, with the consent of the headmaster, be taken this year.

THIRD YEAR

Prescribed Studies

Physical Training. (Two points.)
Hygiene. (See introduction 4.)
Choral Practice. (One point.)
English III. (Three, four, or five points.)

Elective Studies

History III. Modern European History from A.D. 1700.
Mathematics III.
(*a*) Algebra and Geometry, *or*
(*b*) Solid Geometry.
Greek II.
Latin III.
French III.
German III.
Spanish II.
Physiology.
Physics II.
Chemistry I.
Household Science and Arts.
Drawing III.
Music III. (Two points only.) Advanced harmonic analysis, counterpoint, form.
Phonography and Typewriting II.
Commercial Law.
Civil Government.

Any study in the earlier lists not already taken or successfully completed may, with the consent of the head-master, be taken this year.

FOURTH YEAR

Elective Studies

English IV. Literature, composition, rhetoric, history, and formation of the English language, Chaucer.
History IV.
(*a*) The political history of the United States under the constitution, *or*
(*b*) College preparatory history.

Mathematics IV. Algebra and Trigonometry.
Greek III.
Latin IV.
French IV.
German IV.
Spanish III.
Chemistry II.
Physical Geography.
Phonography and Typewriting III.
Drawing IV.
Economics.
Physical Training IV. (Two points.)
Choral Practice. (One point.)

Any study in the earlier lists not already taken or successfully completed may, with the consent of the head-master, be taken this year.

Remarks

The studies of the course are arranged in four lists, corresponding to the four years a pupil is supposed to spend in school.

Roman numerals appended to the name of a study indicate the successive years of work in that study. In general no pupil is allowed to take any subject for which his previous studies have not prepared him.

The number of periods a week, and diploma points, assigned to prescribed studies is indicated in each case.

Except when otherwise stated the number of periods a week, and diploma points, assigned to each elective study is three, four, or five, as determined by the head-masters, each for his own school, with the approval of the Board of Supervisors.

Programs of study made up by the head-masters and showing the number of periods a week and points assigned to

each study must be approved each year by the Board of Supervisors before being put into effect.

II. COURSE OF STUDY FOR THE HIGH SCHOOLS OF CHICAGO

The studies are arranged in four lists corresponding to the four years a pupil is supposed to spend in school.

The first list contains the studies open to a pupil's election in his first year. The second, third, and fourth lists contain respectively the studies open to his election in each of the following years.

SUBJECTS	Number of Recitations per Week	Number of Weeks	Credits
First Year			
English — Classics, Grammar, Composition, and Rhetoric	4	40	.8
Latin	4	40	.8
German	4	40	.8
French	4	40	.8
Spanish	4	40	.8
Mathematics — Elementary Algebra, including Quadratic Equations	4	40	.8
Science — Physiography	6	30	.6
Physiology (required by State law)	4	10	.2
Commercial Studies — Accounting — Including Commercial Arithmetic, Bookkeeping, Business Forms, and Penmanship	6	40	.8
Drawing	2	40	.4
Music	1	40	.2
Physical Culture	1	40	.2

SUBJECTS	Number of Recitations per Week	Number of Weeks	Credits
Second Year			
English — Classics, Grammar, Composition, and Rhetoric	4	40	.8
Latin — Cæsar (four books); Prose Composition	5	40	1.
German	5	40	1.
French	5	40	1.
Greek	5	40	1.
Spanish	5	40	1.
Mathematics — Plane Geometry	4	40	.8
History — Ancient history, chiefly that of Greece and Rome, to the Fall of the Western Empire	4	40	.8
Science — Biology, including either Zoölogy 20 weeks and Botany 20 weeks, or Zoölogy 40 weeks, or Botany 40 weeks	6	40	.8
Commercial Studies — Stenography and Typewriting	6	40	.8
Drawing	2	40	.4
Music	1	40	.2
Physical Culture	1	40	.2
Third Year			
English — Grammar (first half year), Classics, Rhetoric and Composition, and History of Literature	4	40	.8
Latin — Cicero or Virgil; Prose Composition	5	40	1.
German	5	40	1.
French	5	40	1.
Greek	5	40	1.
Spanish	5	40	1.
Mathematics — Advanced Algebra	4	20	.4
Solid Geometry	4	20	.4

SUBJECTS	Number of Recitations per Week	Number of Weeks	Credits
History — History of England, particularly England since 1485. Mediæval and Modern European History, particularly that of Continental Europe	4	40	.8
Science — Physics or Chemistry	6	40	.8
Commercial Studies — Commercial Geography (with special attention to "Commercial" Chicago)	4	40	.8
Drawing	2	40	.4
Music	1	40	.2
Physical Culture	1	40	.2
Fourth Year			
English — Classics, Rhetoric, and Composition, and History of Literature	4	40	.8
Latin — Virgil or Cicero	5	40	.1
German	5	40	1.
French	5	40	1.
Greek	5	40	1.
Spanish	5	40	1.
Mathematics — Trigonometry	4	20	.4
Arithmetic	4	20	.4
History — American History, particularly the history of the United States since the Revolution, and Civics	4	40	.8
Science —			
Chemistry or Physics	6	40	.8
Geology	4	20	.4
Astronomy	4	20	.4
Commercial Studies — Commercial Law, one-half year	4	20	.4
Economics, one-half year	4	20	.4
Drawing	2	40	.4
Music	1	40	.2
Physical Culture	1	40	.2

REQUIREMENTS FOR GRADUATION.—All pupils preparing for graduation will be required to study the English language and literature during a period of four years; and to study some one foreign language for at least two years. One year of mathematics, one year of history, and two years of science will also be required for graduation.

III. COURSE OF STUDY FOR ALL NEW YORK HIGH SCHOOLS EXCEPT COMMERCIAL HIGH SCHOOLS

FIRST YEAR

REQUIRED	PERIODS
English	5
Latin or German or French	5
Algebra	5
Biology, including Botany, Zoölogy and Physiology, in different parts of the year	5
	20

SECOND YEAR

REQUIRED	PERIODS
English	3
Latin or German or French	5
Plane Geometry	4
Greek and Roman History	3
	15

Electives

Greek	5
German	5
French	5
Spanish	5
Chemistry	5
Sewing	4
Additional drawing	1

Third Year

Required	Periods
English	3
Latin or German or French	5
English History	2
Physics [1]	5
Geometry and Algebra (second course) [2]	3
	18

Electives

Cooking	4
Greek	4
German	4
French	4
Spanish	4
Stenography and Typewriting	4
Bookkeeping	3
Economics	3
Botany or Zoölogy	4
Millinery	3

Fourth Year

Required	Periods
English	3
A foreign language	4
Chemistry or Physiography or Biology (Botany or Zoölogy as in third year) [3]	4
English and American History and Civics	4

[1] A student preparing for college, who has already taken two foreign languages, may substitute a third foreign language for science specified. At least one period a week of Physics shall be devoted to unprepared work.

[2] Bookkeeping may be substituted for Geometry and Algebra. Girls who elect manual training may substitute cooking and millinery for physics and the second course in geometry and algebra.

[3] A student preparing for college, who has already taken two foreign languages, may substitute a third foreign language for science specified.

Electives

Physics, as in third year	5
Greek	4
Latin	4
German	4
French	4
Spanish	4
Mathematics	4
Stenography and Typewriting	3
Economics	3
Domestic Science (sewing, cooking, and household economy)	3
Commercial Law and Commercial Geography	3
Additional Latin or Greek or English	3
Mediæval and Modern History	3
Dressmaking	4

GENERAL PROVISIONS

1. A period shall not exceed fifty minutes.

2. Drawing and art study shall be required two periods per week and vocal music one period per week throughout the first two years. Drawing and art study shall be optional one period a week throughout the third and fourth years. Those who intend to enter a training school should take this course throughout the third and fourth years.

3. The equivalent of two periods per week shall be devoted to physical training throughout the course.

4. Drawing and art study, physical training and vocal music shall not be considered as subjects requiring preparation.

5. Of subjects requiring preparation, no student shall be required to take more than 21 periods per week.

6. No new class in an elective subject need be formed in the second year for less than 25 pupils; in the third year for less than 20 pupils; in the fourth year for less than 15 pupils.

7. Exercises in voice training and declamation shall be given at least once a week during the first year, and may be continued throughout the course.

8. In order to graduate from a high school a student must have studied at least one foreign language for at least three years, have accomplished satisfactorily all the other required work, and have taken a sufficient number of elective studies, so that the total amount of required and elective studies shall equal 3000 periods of work requiring preparation, and shall extend over not less than three years and not more than six years. Due credit shall be given by the principal of a high school for work done by a pupil in other high schools.

9. After July 31, 1902, a student's proficiency in each subject presented for graduation shall be determined, in accordance with rules to be prescribed by the Board of Superintendents, by the examination conducted by the College Entrance Examination Board. A diploma of graduation shall be issued to each student who successfully passes this examination and who complies with the foregoing conditions. A certificate of having successfully completed the course of study for high schools shall be issued to each student who has complied with the foregoing conditions, but who does not take the above-mentioned examination.

IV. CURRICULUM OF THE SPRINGFIELD (MASS.) HIGH SCHOOL

FRESHMAN (D) CLASS

REQUIRED SUBJECTS	[1] ELECTIVE SUBJECTS
English (2½)	Free-hand Drawing (2½)
Ancient History (2½)	Art Talks (1)
Science (2½)	[2] Mechanical Drawing (5)
Algebra (5)	Music Analysis (2)
Latin, French, or German (5)	Harmony (2)
Physical Exercise (2)	Chorus (1)

NOTE. — Pupils intending to present Physics for admission to college or technical school may substitute Physics I (5) in place of Science (2½).

SOPHOMORE (C) CLASS

15 prepared recitations is the MINIMUM requirement.

GENERAL COURSE	COLLEGE PREPARATORY
Required Subjects	*Required Subjects*
English (5)	English (2½)
Physics, Geometry, or Botany (5)	Geometry (5)
	Latin (5)
[3] Physical Exercise (2)	[3] Physical Exercise (2)

[1] Permission to pursue an elective subject during the first year may be granted only upon the consent of the principal. An elective subject once chosen must be continued throughout the year. The principal, however, may require a pupil to drop the elective subject provided the pupil is not passing in his other studies.

[2] Those who intend to enter a technical school are advised to take the mechanical drawing.

[3] Counts as unprepared work.

Optional Subjects

Physics I (5)
Geometry (5)
Botany (5)
Latin (5)
French or German (5)
Greek (5)
History, Mediæval and Modern (5)
Harmony (2)

Unprepared Elective Subjects

Free-hand Drawing (2½)
Art Talks (1)
Mechanical Drawing (5)
Music Analysis (2)
Chorus (1)

JUNIOR (B) CLASS

16 recitations is the MINIMUM requirement; 15 must be prepared exercises.

GENERAL COURSE

Required Subjects

English Literature (5)
[1] Physical Exercise (2)
One optional subject in science, history, language, or mathematics (5)

[2] *Optional Subjects*

Chemistry I (5)
Physics II (5)
Higher Algebra (2½)
Solid Geometry (2½)
Latin (5)
Greek (5)
French or German (5)
English History (5)

COLLEGE PREPARATORY

Required Subjects

College English (2½)
Latin (5)
Greek and Roman History (2½)
Higher Algebra (2½)
[1] Physical Exercise (2)

Unprepared Elective Subjects

Free-hand Drawing (2½)
Art Talks (1)
Mechanical Drawing (5)
Music Analysis (2)
Chorus (1)
Cooking (1)

[1] Counts as unprepared work.

[2] The senior courses in astronomy and physiography (5) and in physiology and hygiene (5) may be elected in this year.

Optional Subjects

Free-hand Drawing (5) double periods
Mechanical Drawing (5) double periods
Harmony (2)

SENIOR (A) CLASS

17 recitations is the MINIMUM requirement; 15 must be prepared exercises.

GENERAL COURSE

Required Subjects

English Literature (5)
One optional subject in science, history, language, or mathematics (5)

Optional Subjects

Chemistry II (5)
Physics II (5)
Astronomy and Physiography (5)
Physiology and Hygiene (5)
Latin (5)
Greek (5)
French or German (5)
Review Mathematics ($2\frac{1}{2}$)
College Algebra ($2\frac{1}{2}$)
Trigonometry ($2\frac{1}{2}$)
American History (5)
Free-hand Drawing (5) double periods
Mechanical Drawing (5) double periods
Harmony (2)

COLLEGE PREPARATORY

Required Subjects

College English ($2\frac{1}{2}$)
Latin (5)
Mathematics ($2\frac{1}{2}$)

Unprepared Elective Subjects

Free-hand Drawing ($2\frac{1}{2}$)
Art Talks (1)
Mechanical Drawing ($2\frac{1}{2}$)
Music and Analysis (2)
Chorus (1)
Physical Exercise (2)

V. ST. LOUIS HIGH-SCHOOL COURSES OF STUDY

1. Scientific Course

First Year: English, Algebra, Botany (first half-year), Physiology (second half-year) — required; Latin, German, French, and Spanish — alternative.

Second Year: English, Geometry, Physics, and History — required; Latin, German, French, and Spanish — alternative.

Third Year: English, History, Physics (first half-year), Chemistry (second half-year), and Algebra and Geometry — required; Latin, German, French, and Spanish — alternative — two required.

Fourth Year: English, History, Shakespeare, Chemistry, and Trigonometry — required; Latin, German, French, and Spanish — alternative — two required.

2. Classical Course

First Year: English, Algebra, Botany (first half-year), Physiology (second half-year), and Latin — required.

Second Year: English, Geometry, Physics, Greek, and Latin — required.

Third Year: English, History, Greek, and Latin — required; German, French, and Spanish — alternative.

Fourth Year: English, History, Shakespeare, Greek, and Latin — required: German, French, and Spanish — alternative.

3. General Course

First Year: English, Algebra, Botany (first half-year), Physiology (second half-year) — required; Latin, German, French, and Spanish — alternative.

SECOND YEAR: English, Geometry, and Physics — required; Latin, German, French, and Spanish — alternative.

THIRD YEAR: English and History — required; Physics (first half-year), and Chemistry (second half-year), and Algebra and Geometry — alternative; Latin, German, French, and Spanish — alternative — two required.

FOURTH YEAR: English, Shakespeare, and History — required; Latin, German, French, and Spanish — alternative — two required; Chemistry, Trigonometry, and Psychology (first half-year), Ethics (second half-year) — alternative.

4. ART COURSE

FIRST YEAR: English, Algebra, Botany (first half-year), Physiology (second half-year), and Drawing — required.

SECOND YEAR: English, Geometry, Physics, and Drawing and History of Art — required.

THIRD YEAR: English, History, and Drawing and History of Art — required; Physics (first half-year), and Chemistry (second half-year), Algebra and Geometry — alternative; Latin, German, French, and Spanish — alternative.

FOURTH YEAR: English, History, Shakespeare, and Drawing and History of Art — required; Chemistry, Trigonometry, and Psychology (first half-year), Ethics (second half-year) — alternative; Latin, German, French, and Spanish — alternative.

5. COLLEGE CLASSICAL COURSE

FIRST YEAR: English, Algebra, Botany (first half-year), Physiology (second half-year), and Latin — required; German and French — alternative.

SECOND YEAR: English, Geometry, Greek, and Latin — required; German and French — alternative.

THIRD YEAR: English, History, Greek, Latin, and Algebra and Geometry — required; German and French — alternative.

FOURTH YEAR: English, History, Shakespeare, Greek, and Latin — required; History, Physics, and Studies needed for College — required.

6. COLLEGE SCIENTIFIC COURSE

FIRST YEAR: English, Algebra, Botany (first half-year), Physiology (second half-year), and Latin — required; German and French — alternative.

SECOND YEAR: English, Geometry, Physics, and Latin — required; German and French — alternative.

THIRD YEAR: English History, Physics (first half-year), and Chemistry (second half-year), Algebra and Geometry, and Latin — required; German and French — alternative.

FOURTH YEAR: English, History, Shakespeare, Chemistry, Trigonometry, and Studies needed for College — required; Latin, German, and French — alternative.

7. COURSE PREPARATORY TO TEACHERS' COLLEGE

FIRST YEAR: English, Algebra, Botany (first half-year), Physiology (second half-year), Penmanship, Drawing, and Latin — required.

SECOND YEAR: English, Geometry, Physics, Penmanship, Drawing and History of Art, and Latin — required.

THIRD YEAR: English, History, Chemistry, Penmanship, Drawing and History of Art, and Latin — required.

FOURTH YEAR: English, Shakespeare, History, Physiography, Penmanship, Drawing and History of Art, and Latin — required.

NUMBER OF PERIODS PER WEEK GIVEN TO EACH SUBJECT IN THE ST. LOUIS HIGH-SCHOOL COURSE OF STUDY

	I												II												III							
	Requiring Drawing and History of Art. No foreign language till third year.				Giving choice between Latin and Modern Languages								Requiring Latin, Greek, and a Modern Language								Requiring Latin and a Modern Language				Giving training in Commercial Studies				Giving Manual Training				Preparing for Teachers' College			
	Art				A. General				B. Scientific				A. Classical				B. College Classical				College Scientific				Commercial				Manual Tr.				Preparatory			
No. of Periods per week	20	21	25	25	20	21	25	25	20	21	28	28	20	23	23	27	25	28	28	28	25	26	28	28	23	26	28	30	30	31	33	33	27	28	30	29
Years	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
English	5	5	5	3	5	5	5	3	5	5	5	3	5	5	5	3	5	5	5	3	5	5	5	3	5	5	5	3	5	5	5	3	5	5	5	3
History			3	3			3	3			3	3		3	3			3	3				3	3			3	3–			3	3			3	3
Shakespeare				3				3				3				3				3				3				3				3				3
Psychology				5*–				5–*																				5*–								
Ethics				–5*				–5*																				–5*								
Com'l. Law																																				
Civics																											–5								
Economics																												5–								
Arithmetic																												–5								
Bookkeeping																										3–	5–									
Algebra	5		3–2*		5		3–2*		5		3–2						5		3–2		5		3–2		5				5		3–2		5			
Geometry		5	2–3*			5	2–3*			5	2–3		5	5				5	2–3			5	2–3			5				5	2–3			5		
Trigonometry				3*				3*				3																								
Chemistry			3*	6*			3*	6*			3	6												3			3	6*			3	6			3	
Physics		6	2			6	2			6	2					6				6		6	2			6	2			6	2			6	2	
Biology	5				5				5								5				5				5				5				5			1
Penmanship													5												3								1	1	1	
Typewriting																											2–3	2–3								
Stenography																											3–2	3–2								
Drawing	5	5	5	5																					5°	5°			5	5	5	5	5	5	5	5
Latin			5°	5°	5°	5°	5†	5†	5°	5°	5†	5†		5	5	5	5	5	5		5	5	5		5°	5°	5°		5°	5°	5°	5°	5	5	5	5
German			5°	5°	5°	5°	5†	5†	5°	5°	5†	5†	5		5°	5°	5°	5°	5	5	5°	5°	5°		5°	5°	5°		5°	5°	5°	5°			5°	5°
French			5°	5°	5°	5°	5†	5†	5°	5°	5†	5†			5°	5°	5°	5°	5°		5°	5°	5°		5°	5°	5°		5°	5°	5°	5°			5°	5°
Spanish			5°	5°	5°	5°	5†	5†	5°	5°	5†	5†													5°	5°	5°		5°	5°	5°	5°			5°	5°
Greek														5	5	5		5	5	5																
Col. Studies																				6				5												
Man. Training																													5*	5*	5*	5*				
Dom. Science,																													5*	5*	5*	5*				
Music																																	1	1	1	1
Physiography																																				3
Com'l. Geog.																												–3								

Studies marked with a circle (°) or star (*) are alternative. Of studies marked with a dagger (†) two are required.

8. Manual Training Course

First Year: English, Algebra, Botany (first half-year), Physiology (second half-year), Drawing, and Manual Training — required; Latin, German, French, and Spanish — optional.

Second Year: English, Geometry, Physics, Drawing, and Manual Training — required; Latin, German, French, and Spanish — optional.

Third Year: English, History, Drawing, and Manual Training — required; Latin, German, French, and Spanish — alternative; Physics (first half-year) and Chemistry (second half-year) — alternative with Algebra and Geometry.

Fourth Year: English, Shakespeare, History, Drawing, and Manual Training — required; Latin, German, French, Spanish, Trigonometry, and Chemistry — alternative.

APPENDIX C

TYPICAL GERMAN, FRENCH, ENGLISH, AND SWEDISH CURRICULA

I. GERMANY

CURRICULUM OF GYMNASIUMS

STUDIES	IN PRUSSIA									
	VI	V	IV	IIIb	IIIa	IIb	IIa	Ib	Ia	Total week-hours
Religion	3	2	2	2	2	2	2	2	2	19
German and Historical Stories	3 / 1 } 4	2 / 1 } 3	3	2	2	3	3	3	3	26
Latin	8	8	8	8	8	7	7 }	7 }	7 }	68
Greek	.....	.....	...	6	6	6	6 }	6 }	6 }	36
French	.....	.....	4	2	2	3	3	3	3	20
History	.....	.....	2	2	2	2 }	3 }	3 }	3	17
Geography	2	2	2	1	1	1 }	}	}		
Mathematics	4	4	4	3	3	4 }	4 }	4 }	4 }	34
Natural Science	2	2	2	2	2	2 }	2 }	2 }	2 }	
Writing	2	2								4
Drawing	.....	2	2	2	2	.....	.....	.....	.....	8
Singing	2	2								4
Gymnastics	3	3	3	3	3	3	3	3	3	27
	30	30	32	33	33	33	33	33	33	290

Remarks: —

Where numbers are united by a brace, some elasticity is allowed in the distribution of the time between the two subjects.

Students gifted in music are required from the fourth class on to take part in chorus work.

Students may elect 2 hours of drawing in IV, IIIb, IIIa and IIb, and 2 hours of English and 2 hours of Hebrew in IIa and below.

Pupils of IV and III whose handwriting is poor receive special instruction in penmanship.

A deviation from the regular curriculum is now permissible, in that English may take the place of French in the three upper classes, 2 hours of French being at the same time elective.

In some gymnasiums, especially progymnasiums, a substitution for Greek is allowed in III^b, III^a, and II^b, 3 of the hours going to English, and the others to French and Mathematics (2 hours in III^b and III^a, and 1 to Mathematics, whereas in II^b 1 hour goes to French and 2 to Mathematics). In this way the gymnasial program can be made to coincide substantially with that of the Realgymnasium up to the sixth school year.

The gymnasial program of the other German states does not differ essentially from that of Prussia, except perhaps in Würtemberg, where more stress is laid on Latin and Greek (Latin 81, Greek 40).

In German programs of study the periods are from 50 to 55 minutes in length.

CURRICULUM OF REALGYMNASIUMS

STUDIES	VI	V	IV	III^b	III^a	II^b	II^a	I^b	I^a	Total
Religion	3	2	2	2	2	2	2	2	2	19
German and Historical Stories	3, 1 } 4	2, 1 } 3	3	3	3	3	3	3	3	28
Latin	8	8	7	5	5	4	4	4	4	49
French	.....	.....	5	4	4	4	4 }	4 }	4 }	29
English	.....	.....	....	3	3	3	3 }	3 }	3 }	18
History	.....	.....	2	2	2	2 }	3 }	3 }	3	17
Geography	2	2	2	2	2	1 }	}	}		11
Mathematics	4	4	4	5	5	5	5	5	5	42
Natural Science	2	2	2	2	2	4	5	5	5	29
Writing	2	2								4
Drawing		2	2	2	2	2	2	2	2	16
Singing	2	2								4
Gymnastics	3	3	3	3	3	3	3	3	3	27
	30	30	32	33	33	33	34	34	34	293

Remarks: —

As in the plan for the gymnasium so here the braces indicate that some flexibility is allowed in the time at the disposal of the respective classes.

The above Prussian curriculum for the Realgymnasium does not differ essentially from that of similar institutions in other German States. The length of the periods is from 50 to 55 minutes.

CURRICULUM OF THE PRUSSIAN REALSCHULEN AND OBERREALSCHULEN

STUDIES	REALSCHULE						OBERREALSCHULKLASSEN			
	VI	V	IV	III^b	III^a	II^b	II^a	I^b	I^a	Total
Religion	3	2	2	2	2	2	2	2	2	19
German and History Stories	4 } 5 1 }	3 } 4 1 }	4	3	3	3	4	4	4	34
French	6	6	6	6	6	5 }	4 }	4 }	4 }	47
English	....	....		5	4	4 }	4 }	4 }	4 }	25
History	....	3	3	2	2	2	3	3	3	18
Geography	2	2	2	2	2	1	1	1	1	14
Mathematics	5	5	6	6	5	5	5	5	5	47
Natural Science	2	2	2	2	4	6	6	6	6	36
Writing	2	2	2							6
Freehand Drawing	....	2	2	2	2	2	2	2	2	16
Singing	2	2								4
Gymnastics	3	3	3	3	3	3	3	3	3	27
	30	30	32	33	33	33	34	34	34	293

Remarks: —

These schools, as will be seen, are wholly non-classical. The two together are often called Oberrealschulen. As in previous plans, the braces indicate that flexibility in distribution of time is permissible.

CURRICULUM OF THE SO-CALLED REFORM SCHOOL IN FRANKFORT

STUDIES	VI	V	IV	III^b	III^a	II^b	II^a	I^b	I^a	Total
Religion	3	2	2	2	2	2	2	2	2	19
German	5	4	4	3	3	3	3	3	3	31
Latin	..	..	..	10	10	8	8	8	8	52
Greek	..	..	..	..	..	8	8	8	7	31
French	6	6	6	3	2	2	2	2	2	31
Hist. and Geog.	2	2	6	3	4	2	2	2	3	26
Mathematics	5	5	5	4	4	3	3	3	3	35
Natural History	2	2	3	2	2					9
Physics	..	..	..	..	..	2	2	2	2	10
Writing	2	2	..	..	..					4
Drawing	..	2	2	2	2	..	..	..	..	8
Singing	2	2	..	..	..	..	..	..	..	4
Gymnastics	3	3	3	3	3	3	3	3	3	27
	30	30	32	33	33	32	32	33	33	288

Remarks: —

English and Hebrew are elective and additional as in the regular classical gymnasium. The 'Reform' consists essentially in postponing the beginning of Latin for three years, French being the initial language. It will be noted also that the three languages, French, Latin, and Greek, are somewhat better separated in time, so that more intensive work can be done in each during its initial stages.

The chief practical advantage expected from placing French first and postponing Latin for three years is that parents may delay their decision as to the type of secondary education their children shall have. The reform plan also makes it easier for pupils to enter the gymnasium from the elementary schools.

For detailed information concerning the courses in German gymnasiums see Russell's "German Higher Schools," pp. 213–251.

It may in general be remarked that throughout Germany graduation from a classical gymnasium is required as an antecedent condition to the study of theology; in Prussia graduates

of the Gymnasium, the Realgymnasium, and the Oberrealschule are permitted to study law, while in Würtemberg this privilege is denied to those who have had only the preparation given by the Oberrealschule; graduates of both types of gymnasium are now permitted to study medicine, and also to become candidates for teaching in the secondary schools.

II. PROGRAM OF FRENCH SECONDARY INSTRUCTION

First Cycle

[Duration, four years, from the sixième to the troisième.]

Sixième (11th year of age)

Division A	Hours	*Division B*	Hours
French	3	French	5
Latin	7	Penmanship	1
Modern languages	5	Modern languages	5
History and Geography	3	History and Geography	5
Arithmetic	2	Arithmetic	4
Natural science	1	Natural science	2
Drawing	2	Drawing	2
Total	23	Total	22

Cinquième

French	3	French	5
Latin	7	Penmanship	1
Modern languages	5	Modern languages	5
History and Geography	3	History and Geography	3
Arithmetic	2	Mathematics	4
Natural science	1	Natural science	2
Drawing	2	Drawing	2
Total	23	Total	22

Quatrième (2)

Ethics	1	Ethics	1
French	3	French	5
Latin	6	Bookkeeping	1
Greek (optional)	3	Modern languages	5
Modern languages	5	History and Geography	3
History and Geography	3	Mathematics	4
Mathematics	1 hour (optional) + 1	Physics and Chemistry	2
Natural science	1	Drawing	2+1
Drawing	2		
Total....4 (optional)..	+ 22	Total	24

TROISIÈME

Ethics	1	Ethics	1
French	3	French	4
Latin	6	Elements of law	1
Greek (optional)	3	Modern languages	5
Modern languages	5	History and Geography	3
History and Geography	3	Mathematics	3
Mathematics	1 hour	Physics and Chemistry	2
(optional)	+2		
Drawing	2	Natural science	1
		Bookkeeping	1
		Drawing	2+1
Total....4 (optional)	+22	Total	24

CLASSES OF PHILOSOPHY AND MATHEMATICS

	PHILOSOPHY		MATHEMATICS	
	Section A	Section B	Section A	Section B
	Hours	*Hours*	*Hours*	*Hours*
Philosophy	[a]8	[a]8	3	3
Do	[a]9	[a]9	.....	.....
Greek and Latin	[b]4	.....	.....	.....
Latin	.....	[b]2	.....	.....
Modern languages	[b]2	1+2	2	1+2
History	3	3	3	3
Mathematics	2	2	8	8
Physics and Chemistry	3	3	5	5
Natural sciences	2	2	2	2
Practical exercises in sciences	.....	.....	2	2
Drawing	[b]2	[b]2	[e]2 2	2
Hygiene[d]	.....	.....	.....	.....
Total	[c]18½	[f]21½	27 2	[e]28

[a] During 1 semester.
[b] Optional.
[c] Plus 2 hours optional.
[d] Twelve lectures of one hour each.
[e] Plus 8 hours optional.
[f] Plus 4 hours optional.

Remarks: —

For a comparison of French with American Secondary Education see article by Dr. Compayre in the *Educational Review* for February, 1903.

In common with England, France is rapidly adjusting her secondary education to the needs of the common people. Pupils may now enter non-classical classes of the communal colleges and lycées from the superior primary schools.

III. PROGRAM OF A TYPICAL ENGLISH SECONDARY SCHOOL

The following program shows the general scheme of study for the specified term at Rugby, with detailed particulars as to the required courses in classical and modern languages: —

RUGBY SCHOOL—STATISTICS OF TRINITY TERM ENDING JULY 31, 1901

CLASSICAL

FORM	SIXTH		TWENTY	FIFTH	
	Upper bench	Lower bench			
Number of boys..	21	28	29	27	26
Average age.....	18 years 3 months.	17 years 8 months.	16 years 7 months.	16 years 7 months.	16 years 3 months.
Average time in form.....	4½ terms.	2½ terms.	1¾ terms.	2¾ terms.	2 terms.
Books read					
Greek prose, or (modern) French.....	Epistles to the Ephesians and Colossians.		Ephesians	Herodotus, III, 1–110.	Herodotus, III, 1–105.
Greek verse, or (modern) German.....	Aristophanes, Knights.		Soph. Electra.	.....	.....
Latin prose.....	Cicero's Letters, Tyrell's Selections, I–XX.[a]		Cicero, pro Cluentio, continued to § 81.	Livy, XXXII, 24 to end.	Livy, XXXIII, 1–20.
Latin verse.....	Plautus, Rudens; Virgil, Æneid, III, IV.		Horace, Odes, II.	Horace, Odes, II.	Horace, Odes, II.
English subject..	How and Leigh's Roman History, Arnold's History of Rome, Murray's Greek Literature (part).		Macbeth.	Macbeth.	Macbeth.
Tutor subject....	Plato, Republic, III.		Iliad, VII, VIII, 1–456.	Iliad, VII, VIII, 1–456.	Iliad, VII, VIII, 1–456.

a With selected sets.

CLASSICAL — CONTINUED

Form	VI and upper school specialists in mathematics or science	Lower fifth		Upper middle I	
Number of boys..	16	26	26	29	9
Average age.....	17 years 8 months.	16 years 7 months.	16 years 8 months.	16 years 1 *month.*	16 years 1 *month.*
Average time in form	2½ terms.	2½ terms.	2½ terms.	2 terms.	2 terms.
Books read					
Greek prose, or (modern) French.....	Iliad, XXIII	Xen. Memorabilia, IV.		Lucian, Selections (Inge).	
Greek verse, or (modern) German.....	.....	.....	.....	.....	.....
Latin prose.....	Cicero, in Verrem Actio Primo.	Sallust, Jugurtha, 46–101.		Livy, I, 33–52.	
Latin verse.....	.....	Ovid, Fasti, V, 1–366.		Ovid, Fasti, I.	
English subject..	Much Ado About Nothing. Bacon's Essays, I–XIV.	Macbeth.		Twelfth Night.	
Tutor subject....	.....	Iliad, VII, VIII, 1–466		.....	.....

Form	Upper middle II		Lower middle I		Lower middle II	Lower school
Number of boys	29	29	25	26	17	10
Average age.....	15 years 5 months.	15 years 5 months.	15 years 1 month.	15 years 2 months.	14 years 11 months.	14 years 4 months.
Average time in form.....	1¾ terms.	1¾ terms.	2 terms.	2 terms.	1¾ terms.	1½ terms.
Books read						
Greek prose, or (modern) French.	Xenophon, Anabasis, VII, 1–4.		Xenophon, Anabasis, V (part).		Morice's Attic Greek Stories.	Rivington's Greek Reader second term book, I.
Greek verse, or (modern) German.....						
Latin prose.....	Cæsar, Bell. Gall., II, 23 to end.		Cæsar, Bell. Gall., I (part).		Cæsar, Bell. Gall., IV, V.	Rivington's Latin Reader, fourth term book, III
Latin verse.....	Taylor's Ovid Selections, XIV–XVI.		Ovid, Selections, 50–53 and 1–3 (Heatley and Turner).			
English subject..	Oman's Greece, 33 to end; Twelfth Night.		Gareth and Lynette...		Tennyson's Gareth and Lynette.	Tennyson's Gareth and Lynette.
Tutor subject...	.....	.....	.....	.....	.....	.....

MODERN

Form	VI, XX, V	Lower Fifth	Army Class	
			Upper division, VI, XX, V	Lower division, V, V 2: upper middle I
Number of boys	25	26	23	28
Average age.....	17 years.	16 years 8 months.	16 years 11 months.	16 years 3 months.
Average time in form.....	2½ terms.	2½ terms.	1¾ terms.	2¾ terms.
Books read				
Greek prose, or (modern) French.....	1. Ponsard, l'Honneur and l'Argent; About, Le Roi des Montagnes.	L'Abbé Daniel (Theuriet).	1. Pellissier's Unseens; 2. Gasc. Prosateurs Contemporains.	1. Le Roi des Montagnes; 2. Murat and selections.
Greek verse, or (modern) German.....	1. Schiller, Braut von Messina; Heine, Die Harzreise; 2. Goethe, Italienische Reise.	Townson's Easy German Stories.	1. Selections; 2. Lechner, passages for translation.	1. Selections; 2. Lechner, passages for translation.
Latin prose.....	.....	Selections from Cicero (Walford).	1. Livy, XXIII, continued; 2. Selections.	1. Livy, XXII, 23–40; 2. Siege of Syracuse continued.
Latin verse.....	Æneid, V.....	.....	1. Horace, Selections from Epistles and Satires; 2. Selections.	1. Ovid, Fasti, VI, 500–end; 2. Ovid Fasti, III.
English subject..	Hamlet; Burke, Reflections on the French Revolution.	English History, Henry III–Henry VIII.	Skery, Précis....	Macaulay, Warren Hastings.
Tutor subject...	.....	.....	.....	.....

MODERN — CONTINUED

Form	Upper middle I	Upper middle II and lower middle I	Lower middle II and lower school	Total for whole school
Number of boys	28	28	23	579
Average age.....	15 years 9 months.	15 years 3 months.	14 years 10 months.	.....
Average time in form.....	1¾ terms.	1½ terms.	1½ terms.	.....

Form	Upper middle I	Upper middle II and lower middle I	Lower middle II and lower school	Total for whole school
Books read				
Greek prose, or (modern) French.....	Belfond; Histoires Choisies, part II.	Le Chien du Capitaine	Mateo Falcone .	.....
Greek verse, or (modern) German.....	.....	.....	.....	.....
Latin prose.....	Cæsar, Bell.Gall., VII, 1–43.	Rivington's Reader, fifth term book, III.	Rivington's Reader, fifth term book, I.	.....
Latin verse.....	.....	.....	.....	.....
English subject..	Henry V.	Geography Africa and Australia; History, Henry III–Henry VIII, Acts 9–end, Julius Cæsar.	Africa and Australia; Julius Cæsar; Acts of the Apostles; English History, 1216–1485.	
Tutor subject....	.....	.....	.....	.....

IV. PROGRAM OF A TYPICAL SWEDISH SECONDARY SCHOOL

In Classes I–III all the students have the same courses.[1] With Class IV the school branches into two lines: The classical line (*Latinlinien*) with Latin, and the modern line (*Reallinien*) without that language. In Classes IV and V, however, the difference in the curriculum of the two lines only touches a few subjects, inasmuch as the seven hours Latin and the one hour drawing in the classical line correspond to six hours English and two hours in the other; the courses in history are, moreover, somewhat different, so that the two lines cannot be taught together in that subject. In Class VI: 1, greater differences appear in the two curricula, and at the same time the classical line is subdivided into two sections — Section A, with Greek, and Section B, without Greek.

The teaching extends over five to six hours daily. Instruction in singing, drilling and gymnastics, military drill (obligatory),

[1] See page 255.

and also instruction in English (voluntary) for students in the A section of the two highest classes, and in drawing and instrumental music for boys who desire to learn them, takes place at times outside the regular curriculum, often in the afternoons. Instruction in singing, obligatory to all students with ear and taste for music, in the lower five classes, but optional in the higher classes, must not occupy over two hours a week. Gymnastics is taught in all classes half an hour every day, or, if this is not feasible, at least in such a way that not less than three hours of instruction in the week is given to every division in gymnastics. Sometimes pedagogical gymnastics are replaced by running games conducted under the teacher's supervision and guidance, preferably in the open air. Military drill, replacing gymnastics, for the boys in Classes VI and VII, extends over five weeks at most at the beginning of the autumn term, for altogether sixty hours; during this period the principal may arrange with the teachers for a diminution in the number of school hours for those classes to the extent of from seven to twelve hours a week.

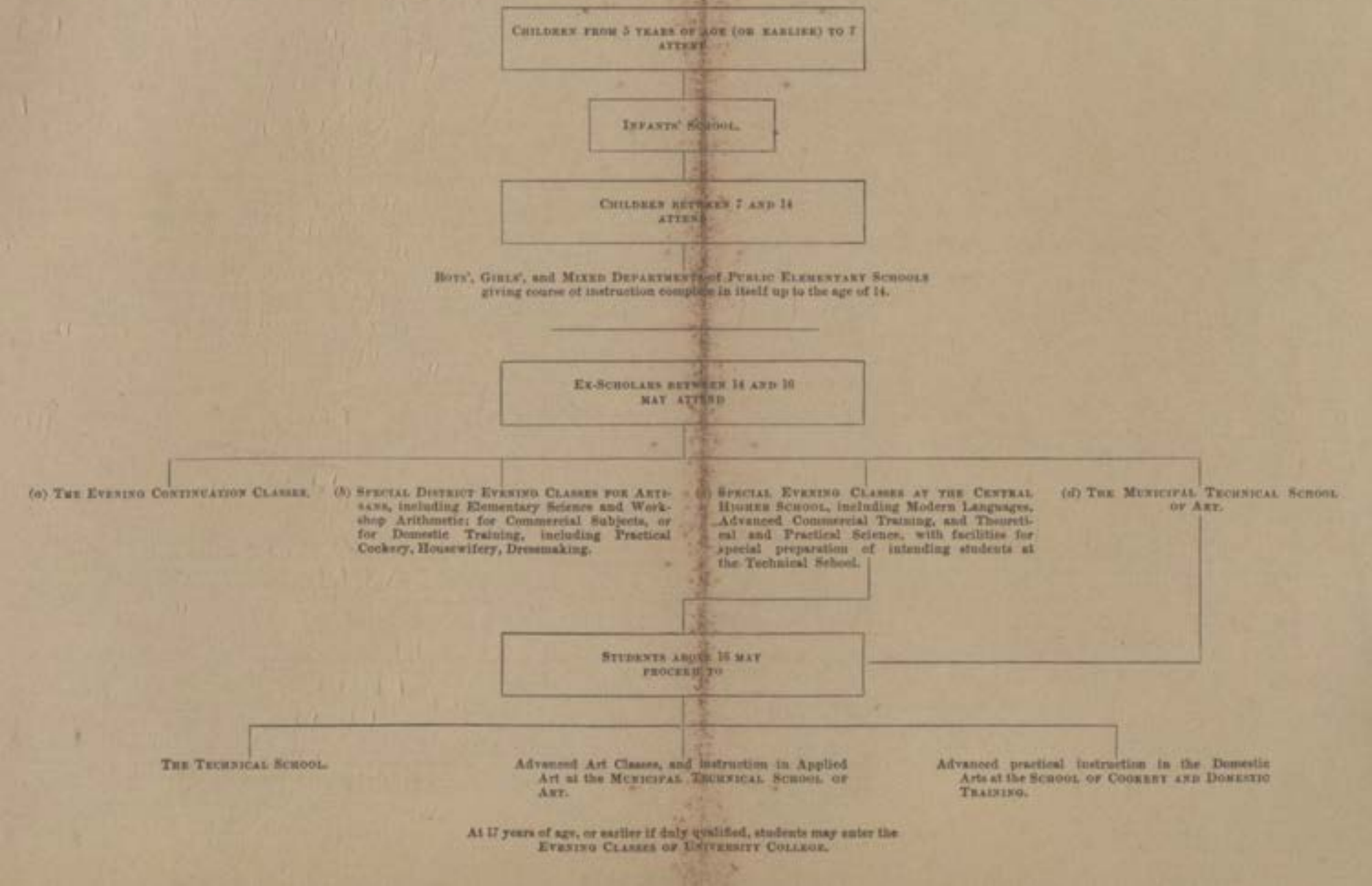
REGULATIONS FOR ENGLISH SECONDARY SCHOOLS ISSUED BY BOARD OF EDUCATION FOR 1905

In the regulations respecting secondary schools issued in 1903 the board of education were careful to define the limits of secondary education, and in so doing clearly recognized the distinction between secondary schools and technical institutes and classes: thus the authority of the government has been won for those who advocate an extended course of general education as a prerequisite to specialized training.

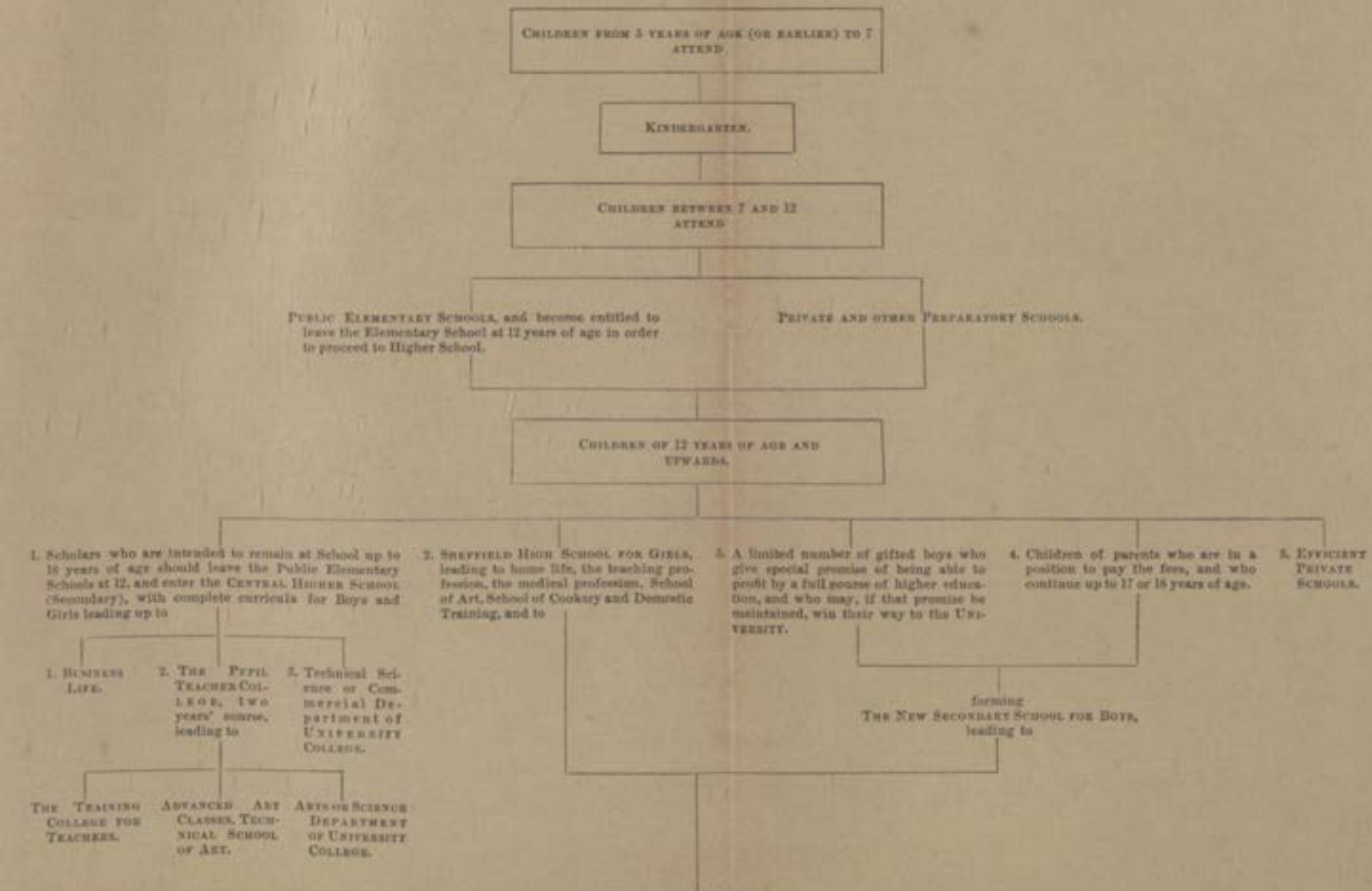
The term "secondary" as defined by the board applies to "any day or boarding school which offers to each of its scholars, up to and beyond the age of 16, a general education, physical, mental, and moral, given through a complete graded course of

Outline Plan of Proposed Organization of Education in Sheffield

(This plan was proposed by Mr. M. E. Sadler and adopted in its substantial features by the school authorities.)



Outline Plan of Proposed Organization of Education in Sheffield



instruction of wider scope and more advanced degree than that given in elementary schools."

As being essential to this course of instruction, the following points are emphasized:—

(*a*) The instruction must be general — *i.e.*, must be such as gives a reasonable degree of exercise and development to the whole of the faculties, and does not confine this development to a particular channel, whether that of pure and applied science, of literary and linguistic study, or of that kind of acquirement which is directed simply at fitting a boy or girl to enter business in a subordinate capacity with some previous knowledge of what he or she will be set to do. A secondary school should keep in view the development and exercise of all the faculties involved in these different kinds of training, and will fail to give a sound general education to its scholars in so far as it sends them out, whether to further study or to the business of life with one or other of these faculties neglected, or with one developed at the expense of the rest. Specialization in any of these directions should begin only after the general education has been carried to a point at which the habit of exercising all these faculties has been formed and a certain solid basis for life has been laid in acquaintance with the structure and laws of the physical world, in the accurate use of thought and language, and in practical ability to begin dealing with affairs.

(*b*) The course of instruction must be complete—*i.e.*, must be so planned as to lead up to a definite standard of acquirement in the various branches of instruction indicated above, and not stop short at a merely superficial introduction to any of them. Secondary schools are of different types suited to the different requirements of the scholars, to their place in the social organization, and to the means of the parents and the age at which the regular education of the scholar is obliged to stop short, as well as to the occupations and opportunities of development to which

they may or should look forward in later life. But in no case can the course of a secondary school be considered complete which is not so planned as to carry the scholars on to such a point as they may reasonably be expected to reach at the age of 16. It may begin at the age of 8 or 9 or even earlier. Scholars may pass into it from elementary schools at various ages beyond this up to 12 or 13, and in schools of a high grade which give an education leading directly to the universities it may be continued up to the age, even, of 18 or 19. But as a rule the years from 12 or 13 up to 16 or 17 will be those during which it is most important that it should be carried on in accordance with a systematic and complete scheme.

(*c*) The instruction must be graded in its various branches. A defect which is notorious in many schools is that in certain subjects (often from causes for which the school authorities are not responsible) instruction of the scholars is cut down to "marking time," or the repetition of lessons already learned. Instruction which is not progressive, while it may be of some use as drill and discipline, is of little real educational value. It gives only a superficial and transitory acquirement while at the same time it fails to interest or to stimulate the scholar.[1]

[1] Report of Commission of Education, 1904.

TIME SCHEDULE FOR THE PUBLIC SECONDARY SCHOOLS OF SWEDEN[1]

Subjects	Lines	I	II	III	IV	V	VI: 1	VI: 2	VII: 1	VII: 2	Hours per week
Religion	All.	3	3	3	2	2	2	2	2	2	21
Swedish	All.	5	5	6	4	3	2	2	2	2	31
History and Geography [b]	All.	4	5	6	4	4	3	3	3	3	35
Philosophy [c]	All.	....	....	....	....	....	.....	.....	1	1	2
Latin	C.	....	....	....	7	7	6	6	7	7	40
Greek	Ca.	....	....	....	....	....	6	6	6	6	24
German	Ca.	6	7	6	4	3	2	2	2	2	34
	Cb. M.	6	7	6	4	3	1	1	1	1	30
English	Cb.	....	....	....	....	....	3	3	2	2	10
	M.	....	....	....	6	6	3	3	3	3	24
French	Ca.	....	....	....	....	3	4	4	3	3	17
	Cb. M.	....	....	....	....	3	4	4	4	4	19
Mathematics	Ca.	4	5	5	5	4	3	3	3	3	35
	Cb.	4	5	5	5	4	4	4	5	5	41
	M.	4	5	5	5	4	6	6	7	7	49
Natual history [d]	Ca.	2	2	2	3	3	.....	.....	.....	.....	12
	Cb. M.	2	2	2	3	3	1	1	1	1	16
Physics	C.	....	....	....	....	....	1	1	2	2	6
	M.	....	....	....	....	....	2	2	3	3	10
Chemistry	M.	....	....	....	....	....	2	2	2	2	8
Penmanship	All.	2	2	1	....	....	.....	.....	.....	.....	5
Drawing	Ca.	1	1	1	1	1	.....	.....	.....	.....	5
Composition [e]	Cb.	1	1	1	1	1	2	2	1	1	11
	M.	1	1	1	2	2	3	3	2	2	17
	All.	....	....	....	....	....	3	3	.....	.....	6
Total	All.	27	30	30	30	30	32	32	31	31	273

[a] Roman numbers denote classes. Ca = classical line A (with Greek); Cb = classical line B (without Greek); M = modern line (the classical and modern lines do not diverge till in the fourth class; and the division of the classical line takes place in class VI: 1).
[b] Special hours are given to geography in Classes I—IV, resp. 2, 2, 3, 1, and 1.
[c] Psychology and logic.
[d] Zoology (I—IV); botany (II—V); physics, astronomy (IV); chemistry, geology (V).
[e] Swedish composition in the class.

[1] Report of the Commissioner of Education for 1904.

APPENDIX D

MANUAL TRAINING HIGH-SCHOOL PROGRAMS

I. BOSTON MECHANIC ARTS HIGH SCHOOL

PROGRAM OF STUDIES

FIRST YEAR

ACADEMIC	HOURS PER WEEK	MONTHS	MECHANIC ARTS	HOURS PER WEEK	MONTHS
Algebra	5	10	Drawing	5	10
General History	2½	10	Carpentry	10	7
English	2½	10	Wood carving	10	3

SECOND YEAR

Algebra	2½	10	Drawing	2½	10
Plane Geometry	5	10	Wood-turning and pattern-making	10	5
History of the United States and Civil Government	2½	10	Forging	10	5
English	2½	10			
French	2½	10			

THIRD YEAR

Solid Geometry	5	5	Drawing	2½	10
Plane Trigonometry	5	5	Machinist's work —		
Physics	2½	10	with hand tools mainly	5	3
English	2½	10	With machine tools mainly	5	7
French	5	10			

FOURTH YEAR

Trigonometry: Applications to physics, surveying, and navigation	2½	10	Drawing	2½	10
Physics, Laboratory work	2½	10	Machine-shop practice and projects, involving the shop work of preceding years	10	10
Chemistry	5	10			
Algebra	2½	10			
Geometry	5	10			
History of the United States	2½	10			
English	2½	10			
French	5	10			
German	5	10			

Academic Department

The main purpose of the mathematical course is to train pupils to habits of accuracy in thought and expression, and to give them clear notions of the value and convenience of mathematical processes in the investigation of practical problems.

The study of algebra extends through two years. The first year's work has special reference to the attainment of proficiency in the more important processes, and extends to simultaneous quadratics. The second year's work is a review of that of the preceding year, and extends through progressions. Algebraic methods are employed in the solution of such problems as are met with in the study of the physical sciences, and in the mechanical departments of the school.

During the second year the subject of plane geometry is completed. The first half of the third year is devoted to the principles of solid geometry, and to numerous exercises illustrating and enforcing them, while the remainder of the year is given to plane trigonometry and reviews.

The work of this year in trigonometry is designed to familiarize the student with the fundamental principles and formulæ.

The subject is continued in the fourth year with special reference to its application to problems in surveying, navigation, and physical science. Considerable attention is given to the transformation of trigonometric expressions and the solution of equations.

The course in history for the first year consists of a rapid survey of the history of Greece and Rome, followed by a study of the History of England, with special reference to its influence upon the Colonial period in America. The study of the political history of the United States during the second year is designed to fix in the mind the causes and results of important historical movements. The work is adapted to trace clearly the growth of the principles of free self-government in England and their development when transplanted into America; to give clear notions of the character and functions of the Colonial government, and of the Municipal, State, and Federal governments of the present day.

The distinguishing feature of the work in English is the emphasis placed upon practice in writing and speaking correctly. Much importance is attached to writing based on the pupil's daily experience. The purpose of this course is to give facility in the correct use of the language, and to cultivate a taste for good literature. The books read are largely determined by the requirements for admission to New England colleges. The careful study of these authors serves to awaken a genuine interest in literature, to raise the standard of reading and thinking, and to improve the literary taste. This work in literature is supplemented by exercises whose merits, rather than defects, are emphasized for improving the style of expression.

The course in French is intended to enable pupils to read simple French with ease and pleasure, and to translate accurately into good English passages of moderate difficulty. Special effort is made to secure correct pronunciation, and to give an intelligent notion of the grammatical structure of the language.

The aims and methods in the German classes are the same as those in the French.

The course in physics, illustrated by lecture-table experiments, explanations, and recitations, is designed to give clear ideas of the fundamental principles and laws in every department of the subject. This work is supplemented by carefully selected laboratory experiments performed by all pupils.

The work in chemistry is adapted to give pupils a comprehensive view of the fundamental facts of the elements of inorganic chemistry. The theoretical study and lecture-table demonstrations are fully illustrated and enforced by individual laboratory work.

The instruction in both physics and chemistry aims to awaken interest in scientific pursuits, and lay a good foundation for subsequent work. The thorough courses in these two branches are believed to be of greater educational value than short courses in a large number of sciences.

Mechanic Arts Department

For each of the mechanical departments a carefully graded series of models has been chosen, the construction of which illustrates every fundamental principle or process. The models in the primary series are made by all the members of a class. Running parallel with the primary series is a set of supplementary models that involve the application of principles already learned to more difficult work. The supplementary exercises are undertaken only by those who are capable of doing more than the regular work of the class.

The aim of the course in drawing is to teach the proper use of the pencil and drawing instruments, and to give facility in the expression of ideas of form by the various methods of free-hand and mechanical representation. About one-third of the time assigned to drawing each year is devoted to free-hand

work, and the remainder to mechanical drawing. In addition to the carefully executed plates much attention is given to the rapid production of mechanical sketches sufficiently accurate for many useful purposes, but by no means finished work. Such sketches frequently furnish the data for complete working drawings.

Drawing

First Year

Descriptive and Plane Geometry. — Projections of single solids, three or more views in third angle. Revolution on various axes. Cutting planes and sections.

Practical geometric problems. Tangents. Polygons.

Developments and Patterns. — Problems of single solids. Shapes of sections, elbows, etc.

Constructive Design. — Application of principles of design in studies for wood-carving.

Building Construction. — Framing details of wooden house construction. Detail of first floor, second floor, attic floor, and roof.

Machine Details. — Working drawings of tools, or builders' hardware.

Expression. — Use of instruments. Inking. Lettering.

Parallel Course in Representative Drawing. — Studies of familiar and beautiful objects. Groups. Home sketches. Studies of historic architecture and ornament. Characteristics of Egyptian, Assyrian, and Greek styles.

Second Year

Descriptive and Plane Geometry. — Projections of intersecting right solids, views in third angle. Revolution on axes. Planes and sections.

Practical geometric problems. Applications to building construction, arches, windows, and decoration of surface.

Applications to machine design, ellipse, oval, helix, and spiral.

Developments and Patterns. — Problems of warped and special surfaces.

Constructive Design. — Application of principles of design in studies for goblets, balustrades, vase forms, etc. Studies for wrought-iron design, grilles, gates, andirons, fire-sets, etc.

Building Construction. — Details of wooden, brick, or stone house construction. Doors, windows, foundations, and chimneys.

Machine Details. — Bolts, nuts, and screw threads. Pulleys.

Expression. — Line shading. Conventions. Tinting. Isometric representation.

Parallel Course in Representative Drawing. — Studies of familiar and beautiful objects. Groups. Home sketches. Drawing from casts. Perspective problems, furniture, interiors, etc. Studies of historic architecture and ornament. Characteristics of Roman, Byzantine, and Saracenic styles.

THIRD YEAR

Descriptive and Plane Geometry. — Projections of single and intersecting right solids in third and first angle. Projection of shadows. Practical geometric problems. Application to machine design; cycloid, epicycloid, hypocycloid, and involute.

Developments and Patterns. — Problems of surfaces and the making of patterns to fit special conditions.

Constructive Design. — Application of principles of design in studies for castings, panels, reliefs, firebacks, etc.

Building Construction. — Plans and elevations of a two-story wooden dwelling-house.

Machine Details. — Gearing. Cranks. Eccentrics. Cams. Selected details of machines; lathes, upright engine, dynamo, etc.

Expression. — Tracings. Blue-prints.

Parallel Course in Representative Drawing. — Studies of groups. Home sketches. Drawing from casts. Memory and imaginative drawing. Perspective problems. Studies of historic architecture and ornament. Characteristics of Romanesque, Gothic, Renaissance, and modern styles.

FOURTH YEAR

Descriptive and Plane Geometry. — Projections of single and intersecting solids, both right and oblique, in third and first angles. Projections of shadows. Advanced geometric problems.

Developments and Patterns. — Special problems in surface development.

Constructive Design. — Application of principles of design in studies for relief, in stone or terra-cotta.

Building Construction. — Plumbing and drainage details. Heating and lighting problems.

Machine Details. — Complete details and assembly drawings from measurements from a lathe, upright drill, shaper, upright engine, etc.

Expression. — Tracings. Blue-prints, Filing, labelling, and checking system.

Parallel Course in Representative Drawing. — Advanced study. Groups, still life. Advanced cast drawing. Perspective problems. Studies of historic architecture and ornament. The Renaissance. Comparison of historic styles.

CARPENTRY AND WOOD-CARVING

1. Measuring and lining exercises.
   a. On a rough board with a two-foot rule and pencil; chalk line, try-square, and pencil; bevel and pencil.

b. On a smooth piece with marking gage; try-square and knife; and with level and knife.

c. On a smooth piece with compasses, straight edge, and knife, making a protractor with 15° divisions.

2. Sawing exercises, preparation of stock for models.

a. Rip and cross-cut sawing to pencil lines; rough board resting horizontally on trestles.

b. Rip sawing in gage lines; piece held upright in the vise.

c. Back-sawing, square ends and sides of grooves; the pieces resting on bench hook.

d. Sawing kerfs in mitre box.

e. Curve sawing with hand turning-saw and power jig-saw.

3. Sharpening exercises.

a. Straight and curved edge-tools on grindstone.

b. Sharpening or bevelling $6 \times 2 \times \frac{1}{8}$-inch white holly on prepared sand-paper block.

c. Whetting straight and curved edge-tools on oil stones.

Applications: plane-iron, chisel, gouge, carving tools, cabinet scraper.

4. Planing exercises.

a. Making plane surfaces; jointing edges and planing to gage lines.

b. Block-planing square ends with pieces held in vise.

c. Oblique edge and end planing.

d. Rabbeting, beading, moulding.

Applications: square prism, octagonal prism, hexagonal prism, winding sticks, picture frame, typical joints.

5. Nailing exercises.

a. Nailing square joints, using cut and wire nails.

b. Toe nailing.

c. Nailing mitre joints.

Applications: nail box, screw box, bracket, picture frame, splice joints.

6. Boring exercises.
   a. Perpendicular boring with auger bits across the grain entirely through.
   b. Perpendicular boring to a given depth, both across and in direction of the grain.
   c. Boring with awls, drills, and countersinks.
7. Chiselling exercises.
   a. Sides and bottoms of grooves across and in direction of the grain.
   b. Oblique surfaces.
   c. Inside of boxes.
   d. Curved surfaces.
   Applications: sliding gage, mortise and tenon, dovetail, oil stone box, glove box, octagonal tool-handles.
8. Gluing exercises.
   a. Rubbed joints.
   b. Clamped joints.
   c. Dowelled and keyed joints.
   Applications: winding sticks, T squares, drawing boards, picture frames, hopper joints.
9. Form work.
   a. Plotting curves from straight lines on plane surface free-hand.
   b. Plotting curves on curved surfaces.
   Applications: coat hanger, bread trencher, hammer handle, octagonal tool-handles.
10. Wood-carving exercises.
   a. Flat and oblique surfaces cut with firmer and skew chisels.
   b. Beads and rosettes cut with firmer and skew chisels.
   c. Cutting straight and curved lines with veining and parting tool.
   d. Fluting and beading with gouges.

e. Geometric designs cut in low relief on flat surfaces. Conventional designs cut in high relief on both plane and curved surfaces.

Applications: pencil tray, book rack, picture frames, stamp box, jewel case, music rack, flower-pot stands.

11. Elementary pattern-making.
    a. Description and use of simple moulder's flask.
    b. Names and uses of moulder's tools.
    c. Characteristics of moulder's and pattern-maker's materials.
    d. Characteristics of patterns; shrinkage, draft, and finish.
    e. Finishing of patterns.

    Applications: awning hinge, angle and machine wrench, double-end S wrench, straight and bevel boat chocks, cleat, oiler shelf, boat book, parts of machines.

Wood-Turning and Pattern-Making

1. WOOD-TURNING

Each of the four exercises illustrates a fundamental operation. The useful models, begun as applications of the first exercise, are finished as applications of subsequent exercises.

Exercises

1. Cylindrical and plane surfaces.
2. Conical surfaces.
3. Convex curved surfaces.
4. Concave curved surfaces.

Applications:

Turning between centres: file handles, carving mallet, chalk line reel and awl handle, stocking ball and needle box.

Chuck turning: napkin ring, powder box.

Supplementary Work

Bench stop, tool handles, mallet, rolling pin, oil-spoon handle, glove ball, gavel, dumb bells, Indian clubs, candlestick, stool, towel ring, boxes, match safe, cups and goblets, spheres, vase forms, mirror frame.

II. PATTERN-MAKING

Small change gear, shaft collar (green sand core), hollow chuck (split) with core box, spoked gear (segment work).

Supplementary Work

Paper weight, collar, blank for taper socket, face plate, screw chuck, eccentric, eccentric strap, fixture for turning eccentric, pipe elbow and core box, tee rest, stand for tee rest with core box, hand wheel, pulley, shaft hanger with yoke and box.

FORGING

1. Description and operation of forge and care of fire.
2. Names, characteristics, and uses of tools.
3. Typical processes: drawing, shouldering, forming, bending, upsetting, twisting, scarfing, welding, punching, hardening, and tempering.
4. Sources and properties of materials: common iron, Norway iron, Bessemer steel, open-hearth steel, crucible steel, high-speed steel.
5. Applications: butt ring, hook and staple, bolt, nut, timber hanger, bracket, eye bolt and ring, chain and hook, tongs, centre punch, cold chisel, cape chisel, spring, lathe tools, square reamer.

Machine-Shop Practice

1. Chipping and filing of plane surfaces — cast iron.
   - *a.* Use of measuring and marking tools.
   - *b.* Chipping narrow surfaces with flat chisel.
   - *c.* Chipping broad surfaces with cape and flat chisels.
   - *d.* Filing flat surfaces and testing with straight edge.
2. Drilling cast iron — finished model No. 1.
   - *a.* Accurate location of holes.
   - *b.* Form and action of flat drill.
3. Filing and fitting: a sliding fit — cast iron.
   - *a.* Filing plane surfaces at right angles, testing with try-square.
   - *b.* Production of parallel surfaces, testing with calipers.
   - *c.* Fitting piece to slide in groove of fixed dimensions.
   - *d.* Chamfering.
   - *e.* Draw-filing, and polishing with emery cloth.
4. Clamp — machinery steel, case-hardened.
   - *a.* Filing, drilling, hack-sawing, chipping, and tapping steel.
   - *b.* Hand turning and knurling in steel.
   - *c.* Use of turret tools for threading.
5. Ring bolt and square head bolt — wrought iron.
   - *a.* Tapping nuts.
   - *b.* Threading with adjustable and solid dies.
6. Machinist's clamp — machinery steel.
   - *a.* Filing, drilling, and tapping steel.
   - *b.* Hand turning in steel.
   - *c.* Threading with die, at the lathe.
7. Surface plate — cast iron, brass handles.
   - *a.* Planing — roughing and smoothing cuts.
   - *b.* Drilling and tapping.
   - *c.* Hand turning in brass.
   - *d.* Use of die.
   - *e.* Scraping.

8. Paper weight — composition metal.
   a. Use of turret and slide rest.
   b. Hand turning.
   c. Polishing and lacquering.
9. A set of lathe tools—shaping faces that form a cutting edge.
10. Perfect cylinder — cast iron.
   a. Centring.
   b. Truth of live centre.
   c. Alignment of dead centre; geometrical relation of the axis of revolution to the tool path.
   d. Squaring ends.
   e. Turning: use of automatic feed.
11. Stud bolt — machinery steel.
   a. Turning and finishing steel.
   b. Screw-cutting in the lathe.
12. Finished hexagon head bolt and nut — wrought iron.
   a. Facing a nut.
   b. Turning — ream fit.
   c. Screw cutting — stopping the thread.
   d. Milling nuts.
   e. Milling bolt-head with straddle mills.
13. Plate centre — cast iron, steel shank.
   a. Chucking a hole in a solid casting; use of chuck-drill and reamers.
   b. Turning on a mandrel.
   c. Taper-turning.
   d. Drive fit.
14. Wrist pin — cast iron.
   a. Chucking a cored hole; use of chucking and hand-reamers.
   b. Turning and fitting mandrel, and use of same.
   c. Centring pin at right angles to sleeve.
   d. Turning pin with head and shoulder.

15. Hollow chuck — cast iron.
    a. Inside threading, finishing with tap in the lathe.
    b. Boring and turning on stub mandrel.
    c. Finishing with hand tools and polishing.
16. Engine crank, shaft and pin — cast iron and steel.
    a. Boring on face plate.
    b. Turning shaft — drive fit.
    c. Turning pin — shrink fit.
    d. Planing key-ways.
    e. Fitting key.

Supplementary Exercises

Pins for planer table, with and without screws, lathe centres, machine handles, calipers, hammers, binding-posts, brass ornaments, skate runners, bolts, tool-post screws, sleeves, plain and threaded collars, and other simple machine parts. These pieces may call also for work upon the planer, shaper, milling machine, or grinding machine.

17. Advanced work.

The models of the latter part of the course, varying considerably from year to year, consist of more difficult single pieces, small tools, and simple machines, or portions of machines, including closely related parts which one pupil makes and assembles. Examples: drill sockets, gears, mandrels, reamers, counterbores, taps, milling cutters, eccentric and straps, parts of a hand lathe, engine, dynamo, drill press, or other machine.

II. COURSE OF STUDY IN THE RICHARD T. CRANE MANUAL TRAINING HIGH SCHOOL, CHICAGO

First Year

Rhetoric and Composition (4).
Algebra (4).

Physiology, 10 weeks, Physiography, 30 weeks (4).
Mechanical Drawing (4), Free-hand drawing (1).
Wood-turning, Joinery, Cabinet work, Pattern work, each 10 weeks (10).

Second Year

English and American Literature, 20 weeks (3).
German or French or Spanish (3).
Plane Geometry (3).
Biology (3).
Ancient and Mediæval History, 20 weeks (3).
Mechanical Drawing (4), Free-hand Drawing (1).
Pattern-making and Foundry Practice, 20 weeks (10).
Blacksmithing, 20 weeks (10).

Third Year

English Readings, 20 weeks (3).
German or French or Spanish (3).
Solid Geometry, 20 weeks, Higher Algebra, 20 weeks (3).
Physics (3).
Modern History, 20 weeks (3).
Machine or Architectural Drawing (4), Free-hand Drawing (1).
Machine Shop Practice (10).

Fourth Year

College Entrance Readings and Thesis Writing (4).
Plane and Spherical Trigonometry, 20 weeks (4).
American History and Civil Government (4).
Machine Design, Architectural Design, or Industrial Art Design (5).
Political Economy, 20 weeks (4).

ELECTIVE STUDIES: Ten hours per week must be elected from the following: —

German or French or Spanish (5).
Advanced Physics (5).
Chemistry (5).
Review of Manual Training, with Talks on the Educational Value of Shop Practice.

III. COURSES OF STUDY FOR MANUAL TRAINING HIGH SCHOOLS, NEW YORK CITY

MANUAL TRAINING COURSE FOR BOYS

First Year

REQUIRED[1]	PERIODS
English (Grammar, Rhetoric, and Composition)	5
German or French or Latin	5
Algebra	5
Free-hand and Mechanical Drawing	4
Joinery	6
	25

NOTE. It is expected that each student will take twenty-five hours recitation per week. An election from the other courses to make up this amount is required. This course does not prepare for college.

Second Year

REQUIRED	PERIODS
English	3
German or French or Latin	5
Plane Geometry	4
Free-hand and Mechanical Drawing	4
Wood-turning, Pattern-making, Moulding, and Sheet-metal Work	6
	22

ALTERNATIVES	PERIODS
German or French or Chemistry	5

[1] Physiology and hygiene, as required by law, shall be taught the equivalent of four lessons a week for ten weeks.

Third Year

REQUIRED	PERIODS
English	3
German or French or Latin	5
Physics (only four lessons prepared)	5
Advanced Algebra and Plane Trigonometry	3
Mechanical Drawing	2
Forging	6
	42

ALTERNATIVES	PERIODS
German or French, or Chemistry	4

Fourth Year

REQUIRED	PERIODS
English	3
A foreign language	4
English and American History and Civics	4
Mechanical Drawing	2
Machine shop practice [1]	6
	19

Alternatives; any two of the following:

A second language	4
Chemistry	4
Physics	4
Spherical Trigonometry and Solid Geometry	4

GENERAL PROVISIONS

1. A period shall not exceed fifty minutes.

2. Vocal music shall be required one period per week throughout the first two years.

3. The equivalent of two periods per week shall be devoted to physical training throughout the course.

[1] With the approval of the principal, a pupil preparing for a technical college course may substitute an academic subject for machine-shop practice.

4. Drawing and art study, physical training, shop work, and vocal music shall not be considered as subjects requiring preparation.

5. Of subjects requiring preparation, no student shall be required to take more than 19 periods per week.

6. No new class in an elective subject need be formed in the second year for less than 25 pupils; in the third year for less than 20 pupils; in the fourth year for less than 15 pupils.

7. Exercises in voice training and declamation shall be given at least once a week during the first year, and may be continued throughout the course.

8. In order to be graduated from this course, a student must have studied at least one foreign language for at least three years, have accomplished satisfactorily all the other required work, and have taken a sufficient number of elective studies so that the total amount of required and elective studies shall equal 2500 periods of work requiring preparation and 1000 periods of drawing and shop work, and shall extend over not less than three years nor more than six years. Due credit shall be given by the principal for work done by the pupil in other high schools.

APPENDIX E

COMMERCIAL HIGH SCHOOL PROGRAMS

I. OFFICIAL CURRICULUM FOR COMMERCIAL ACADEMIES IN AUSTRIA[1]

Subjects of Study	Hours per Week			
	First Year	Second Year	Third Year	Fourth Year
Required				
German	4	3	3	2
French Language and Correspondence	4	4	4	4
English Language and Correspondence	..	4	5	5
Commercial and Industrial Geography	2	2	2	2
History of Commerce	2	2	2	2
Algebra and Political Arithmetic	2	2	2	2
Geometry	2	..	..	..
Commercial Arithmetic	3	3	3	3
Natural History	3	..	..	..
Physics	4	..	..	..
Chemistry and Chemical Technology	..	2	2	..
Commercial Products and Mechanical Technology	..	..	2	2
Knowledge of Commerce	2	2	..	..
Commercial Correspondence	..	2	3	1
Bookkeeping	..	2	3	2
Accounting	..	..	..	3
Laws of Exchange	..	..	..	1
Commercial and Industrial Law	..	..	..	2
Political Economy	..	..	..	2
Penmanship	2	2	..	..
Shorthand	2	2	..	..
Totals	32	32	32	32
Optional				
Bohemian, Italian, Spanish, English, or French	..	3	3	3
Practice in Analytical Chemistry	..	..	2	2
Practical Tests for Products	..	..	2	2
Gymnastics	2	2	2	2
Typewriting	..	..	..	2

[1] From C. A. Herrick's *Commercial Education.*

II. BOSTON HIGH SCHOOL OF COMMERCE

Program of Studies

First Year

Required	Periods Per Week	Elective	Periods Per Week
English	4		
German	4		
Penmanship, first half; Business Knowledge and Practice, second half	4		
Physics, one-half year; Physical Geography, one-half year	4		
Algebra (with commercial applications)	4		
General History, Ancient and Mediæval	3		
	23		

Second Year

Required	Periods Per Week	Elective (Drop starred subject.)	Periods Per Week
English	4	Stenography (to be pursued three years)	5
German	4		
*French or Spanish	3		
Bookkeeping	4		
Commercial Geography, one-half year; Local Industries, one-half year; Observational Geometry, first half; Commercial Arithmetic, second half	4		
	23		

Third Year

Required	Periods Per Week	Elective One subject required. Two may be taken by dropping starred language.	Periods Per Week
English	4	Bookkeeping	4
German	4	Stenography (continued)	4
*French or Spanish	3	Freehand Drawing	3
Chemistry	5		
†Typewriting	1		
Modern History, first half Economic History, second half	4		
	21		

(† Not taken by pupils pursuing advanced work in Business Technique. 277.)

Fourth Year

Required	Periods Per Week	Elective One subject required. Two may be taken by dropping starred language.	Periods Per Week
Commercial English, Advertising, Correspondence, first half	4	Bookkeeping, Accounting, Typewriting	6
English, second half		Stenography and Typewriting	6
German	3	Mechanical Drawing	3
*French or Spanish	3	Commercial Design	3
Algebra (review), one-third year		Chemistry, Applications	5
Plane Geometry, two-thirds year	4	Economics, Application, first half	5
†Typewriting	1	Political Economy, second half	5
Commercial Law, first half Civil Government, second half	4		
	19		

† Not taken by pupils pursuing advanced work in Business Technique. 277.)

Program of the Boston High School of Commerce

Arranged by Subjects

English: Four periods per week for three and one-half years. Commercial English, Advertising, Correspondence, first half, fourth year.

Modern Languages: German, four periods for three years, three periods for one year. French or Spanish, three periods during second, third, and fourth years.

Economics and History: General History, three periods during first year. Modern History, four periods, first half, third year. Economic History, four periods, second half of third year. Commercial Geography, four periods, first half, second year. Local Industries, four periods, second half of second year. Commercial Law, four periods, first half, fourth year. Civil Government, four periods, second half of fourth year. Economics (elective), five periods, first half of fourth year. Political Economy (elective), five periods, second half of fourth year.

Mathematics: Algebra, four periods during first year; review, four periods, three months in fourth year. Observational Geometry, four periods, first half of second year. Plane Geometry, four periods, first half of second year. Plane Geometry, four periods, fourth year. Commercial Arithmetic, four periods, second half, second year.

Business Technique: Penmanship, four periods, first half, first year. Business Forms and Practices, four periods, second half, first year. Bookkeeping, four periods, second year. Advanced Bookkeeping (elective in third and fourth years), four periods, third year; six periods, fourth year. Typewriting, either one period, third and fourth year, or in the advanced bookkeeping and stenography courses. Stenography (elective), five periods, second year; four periods, third year; six periods, fourth year.

SCIENCE: Elementary Physics, four periods, first half, first year. Physical Geography, four periods, second half, first year. Chemistry, five periods, third year. Advanced Applied Chemistry (elective), five periods, fourth year.

DRAWING (elective): Free-hand, three periods, third year. Mechanical Drawing, three periods, fourth year. Commercial Design, three periods, fourth year.

III. SCHOOL OF COMMERCE IN THE RICHARD T. CRANE MANUAL TRAINING HIGH SCHOOL OF CHICAGO

COURSE OF STUDY

FIRST YEAR:

Rhetoric and Composition (4).
German or French or Spanish (4).
Physiology, 10 weeks, Physiography, 30 weeks (4).
Algebra (4).
Bookkeeping and Business Forms (4).

SECOND YEAR:

English and American Literature, 20 weeks (3).
German or French or Spanish (two languages required) (3).
Raw Products and Commercial Geography (5).
Plane Geometry (3).
Ancient and Mediæval History, 20 weeks (3).
Stenography and Typewriting (5).

THIRD YEAR:

English Readings, 20 weeks (3).
German, French, Spanish (two languages required) (3).
Physics (3).
Industrial and Commercial Chicago (2).
History of Commerce (2).
Modern History (20 weeks) (3).
Political Economy (20 weeks) (3).
Business Law (2).

FOURTH YEAR:

English Reading and Thesis Writing (4).
German or French or Spanish (two languages required) (4).
Chemistry (5).
American History and Civil Government (4).
Banking and Finance, Business Methods, Ethics of Business (4).

IV. COURSE OF STUDY OF THE SUPERIOR SCHOOL OF COMMERCE OF THE CITY OF GENEVA

[To be admitted, students must have attended elementary schools for at least eight years.]

STUDIES	HOURS PER WEEK		
	First Year	Second Year	Third Year
Mother tongue (French)	3	3	3
Second Swiss language (German)	4	4	4
English, Italian, or Spanish (optional) each	4	4	4
Commercial arithmetic and mathematics	5	3	3
Bookkeeping	4	.....	.....
Counting-house practice	.....	6	8
Commercial law, political economy	.....	5	4
Chemistry, physics, and knowledge of merchandise	4	3	5
Geography	2	2	2
History	2	2	.....
Penmanship	3	2	.....
Stenography and typewriting	.....	.....	2
Drawing	2	.....	.....
Total	33	34	35

The courses of other commercial schools are very different from this, yet everywhere great attention is given to languages. German and French are the principal branches in all these schools, and three, four, five, and six hours a week are devoted to each. The following are either optional or obligatory: English, Italian, Spanish, Russian, and in addition to these, at the commercial academy of St. Gall, Dutch, Portuguese, Arabic,

modern Greek, and Malay are offered. Besides languages, according to the character of the school, either the historical and mathematical-scientific or the commercial branches receive the most attention, without any one group being altogether neglected. History, geography, physics, and chemistry, the latter two mostly combined with technology, and the study of merchandise, algebra, commercial arithmetic, bookkeeping, office work, political economy, commercial law, penmanship, stenography, and typewriting — these branches, under various designations, it is true, and grouped in different ways, with more or less time devoted to each, are included in the curriculum of all the commercial high schools of Switzerland.

V. CURRICULUM OF THE LEIPZIG COMMERCIAL HIGH SCHOOL[1]

Studies	First Year	Second Year	Third Year
Required			
German	4	3	3
English Language and Correspondence	5	4	5
French Language and Correspondence	5	4	5
Mathematics	3	3	4
Mercantile Arithmetic	5	3	2
Physics	2	2	..
Technology	..	..	2
Chemistry	..	2	2
Materials of Commerce (*Warenkunde*)	..	..	1
General and Commercial Geography	2	2	2
General and Commercial History	2	2	2
Commercial Information, Laws of Commerce and Exchange	..	2	1
Office Work, Correspondence, and Bookkeeping	..	3	3
Economics	..	..	2
Penmanship	2	2	..
Shorthand	2	1	12
Gymnastics	2	2	..
Electives			
Italian	..	2	2
Spanish	..	..	2

[1] From C. A. Herrick's *Commercial Education*.

VI. FRENCH SUPERIOR COMMERCIAL SCHOOL AT LYONS[1]

Subjects	Class Hours per Week	
	First Year	Second Year
Studies Common to All Three Groups		
Commercial, shipping, and industrial law	2	2
Labor, fiscal, and customs legislation	..	2
Political economy	..	2
History of commerce	..	1
French language	1	1
Modern language	4	4
General Commercial and Banking Studies		
Commerce and bookkeeping	12	12
Penmanship and commercial correspondence	3	2
Economic geography	3	3
Study of merchandise	3	3
Second modern language	4	4

Subjects	Class Hours per Week	
	First Year	Second Year
Studies preparatory to the Silk Trade and Industry		
Theory and practice of the special trade in silk goods	18	16
Bookkeeping and penmanship	3	2
Economic geography	2	2
Technology of textiles	1	1
Applied mechanics	1	1
Drawing	2	2
Studies preparatory to the Trade in Dyeing and Chemical Products		
Theory and practice of the special trade in dyeing products	2	25
Theory and practice of the special trade in chemical products	25	2
Bookkeeping and penmanship	3	2
Economic geography	2	2
Applied mechanics and physics	1	1
Drawing	1	1

[1] From C. A. Herrick's *Commercial Education*.

VII. COURSE OF STUDY, THE HIGH SCHOOL OF COMMMERCE, NEW YORK CITY

First Year

REQUIRED	PERIODS
English	4
German, French, or Spanish	4
Algebra	4
Biology [1] (with especial reference to materials of commerce)	4
Business Knowledge and Practice [2]	6
Drawing (second half-year)	2
Physical Training [1]	2
Music	1
	27

Second Year

REQUIRED	PERIODS
English	3
German, French, or Spanish	3
Plane Geometry	4
Chemistry (with especial reference to materials of commerce)	4
History [3] (with especial reference to economic history and geography)	3
Stenography	3
Drawing and Art Study	2
Physical Training	2
	24

[1] Including Physiology.

[2] Including Local Industries and Government of the City of New York 2
Business Writing 2
Business Arithmetic, Business Forms and Methods 2

[3] First half-year, Beginning of Nations to 1300 A.D. Second half-year, Modern History to 1750.

ELECTIVES	PERIODS
German, French, or Spanish	4
Bookkeeping and Business Forms	3
Business Arithmetic	1
Commercial Geography	1

Third Year

REQUIRED	PERIODS
English	3
German, French, or Spanish	4
Geometry and Algebra [1]	3
Physics	5
History [2] (with especial reference to materials of commerce)	3
Drawing and Art Study	1
Physical Training	2
	21

ELECTIVES	PERIODS
German, French, or Spanish	4
Bookkeeping and Business Arithmetic	3
Stenography and Typewriting	3
Drawing and Art Study	2
Commercial Geography	1

Fourth Year

REQUIRED	PERIODS
English	3
German, French, or Spanish	4
Economics and Economic Geography	4
History of the United States (with especial reference to industrial and constitutional aspects)	4
Physical Training	2
	17

[1] In the second half-year students may elect additional Stenography and Typewriting or Bookkeeping in place of the second course in Mathematics, or may give double time to Mathematics by omitting either Stenography or Bookkeeping.

[2] First half-year, English and Colonial History, 1620 to 1750. Second half-year, Modern History (England and the Continent), 1750 to present time.

ELECTIVES	PERIODS
A Foreign Language	4
Advanced Chemistry	4
Economic Biology	4
Trigonometry and Solid Geometry	4
Elementary Law and Commercial Law[1]	4
Advanced Bookkeeping, Business Correspondence and Office Practice	4
Stenography and Typewriting	4
Drawing and Art Study	4
Modern Industrialism	1

Fifth Year

REQUIRED	PERIODS
English	3
Logic, Inductive and Deductive	3
Physical Training	2
	8

ELECTIVES	PERIODS
A Foreign Language	4
Advanced Mathematics	4
Advanced Physics	4
Industrial Chemistry	4
Economic Geography	4
19th Century History, Europe and Orient; Diplomatic History, United States and Modern Europe	4
Banking and Finance, Transportation and Communication	4
Administrative Law and International Law	4
Accounting and Auditing	4
Business Organization and Management	4
Drawing	4
Advanced Economics	3

[1] Students who do not elect law in the fourth year may receive instruction in Commercial Law in connection with Advanced Bookkeeping.

GENERAL PROVISIONS

1. A period shall not exceed fifty minutes.

2. Drawing and art study, physical training and vocal music, shall not be considered as subjects requiring preparation.

3. Of subjects requiring preparation, no student shall be required to take more than 21 periods per week.

4. No new class in an elective subject need be formed in the second year for less than 25 pupils; in the third year for less than 20 pupils; in the fourth year for less than 15 pupils.

5. Exercises in voice training and declamation shall be given at least once a week during the first year, and they may be continued throughout the course.

6. In order to graduate from the High School of Commerce a student must have studied at least one foreign language for at least three years, have accomplished satisfactorily all the other required work, and have taken a sufficient number of elective studies so that the total amount of required and elective studies shall equal 3000 periods of work requiring preparation, and shall extend over not less than three years and not more than six years. Due credit shall be given by the principal for work done by a pupil in other high schools.

7. A certificate of graduation shall be awarded at the close of the fourth year to each student who satisfactorily completes the work up to that point. The fifth year shall be regarded as supplementary to the regular course, and shall be open to all students who have graduated from a high-school course of four years.

VIII. CURRICULUM OF STUDIES IN THE PHILADELPHIA SCHOOL OF COMMERCE[1]

SUBJECTS BY GROUPS

I. English Language and Literature.

II. Modern Languages.

[1] From the report of Director C. A. Herrick.

III. Mathematics.
IV. Science.
V. History.
VI. Economics.
VII. Business Technique.

I. English Language and Literature

First Year. *Latin in English.* English Etymology; study of selected Latin vocabularies; Latin syntax as a basis for syntax of English and the Modern Languages; review of English Grammar; introductory language study. Three hours a week.

History of American Literature; and *Composition Writing.* Text-books: Smyth, *History of American Literature,* and J. Morgan Hart, *Composition and Rhetoric.* Three hours.

Second Year. *History of English Literature to Eighteenth Century,* with illustrative readings. *Composition* and *Letter Writing,* answering advertisements, etc. Text-books: Pancoast, *Introduction to the History of English Literature;* selections from *English Classics Series,* and Altmaier, *Commercial Correspondence and Postal Information.* Three hours.

Third Year. *Eighteenth-century Literature.* Special studies in Addison, *Spectator Essays,* and Burke, *Conciliation with America* and *Reflections on French Revolution.* More finished essays required. Practice in declamation.

Fourth Year. *Nineteenth-century Literature.* Readings and Reports by students (half year). *Shakespearean Drama,* reading and analysis of representative plays (half year). *Thesis Writing,* an essay setting forth results of extended study on some topic connected with trade and industry. Three hours.

II. Modern Languages

Second Year. *German.* Grammar, Reading and Exercises. Text-books: Joynes-Meissner, *German Grammar,* and Super, *German Reader.* Five hours.

THIRD YEAR. *German.* Reading, Composition and Conversation. Text-books: Joynes-Meissner, *Grammar;* Von Hillern, *Höher als die Kirche;* Zschokke, *Der zerbrochene Krug,* and Harris, *Prose Composition.* Three hours.

French. Beginning French (elective with Spanish). Syntax, Pronunciation, and Reading. Text-books: Fraser and Squair's *French Grammar,* and Kuhn, *French Reader.* Four hours.

Spanish. Beginning Spanish (elective with French). Reading, Syntax, Pronunciation, and Exercises. Text-books: De Tornos, *Combined Spanish Method;* Ramsey's Reader, *Gil Blas.* Four hours.

FOURTH YEAR. *German.* Advanced Reading, Composition, and Correspondence. Text-books: Thomas, *German Grammar;* Schiller, *Wilhelm Tell;* Dann, *German Commercial Correspondence;* and Keller, *Bilder aus der Deutschen Literatur;* Lessing, *Minna Von Barnhelm.* Three hours.

French. Reading, Conversation, Composition, and Correspondence. Actual correspondence is carried on with students of English in French Schools. Drill on business letters, and use of commercial terms. A voluntary class in conversation. Text-books: Newson, *French Daily Life;* Foncin, *Le Pays de France;* Dumas, *Monte Cristo;* François, *French Composition,* and Korts, *Commercial Correspondence.* Three hours.

Spanish. Advanced grammatical study, Reading, Exercises in composition, and Commercial Correspondence. Text-books: Galdos, *Dona Perfecta;* Graham Oliver's, *Spanish Commercial Practice;* Yanez, *Correspondencia Comercial.* Three hours.

III. MATHEMATICS

FIRST YEAR. *Elementary Algebra.* Text-book: Wentworth, *New School Algebra.* Five hours.

SECOND YEAR. *Commercial Arithmetic.* Mental Arith-

metic, short processes, rapid calculation, interest and discount methods, measurements, familiarity with the metric system, alligation and mensuration. Text-book: Schneck, *Modern Commercial Arithmetic.* Two and a half hours.

Plane Geometry. Text-book: Wentworth, *Plane and Solid Geometry.* Two and a half hours.

FOURTH YEAR. *Review Course and Advance Work in Mathematics* (elective). Application of mathematics to business operations, as averaging, annuities, etc.; use of standard tables for reckoning. Selected text-books, assigned topics and lectures. Three hours.

IV. SCIENCE

FIRST YEAR. *Commercial Products; Raw Materials of Commerce.* Economic mineralogy, botany, and zoölogy. This course is science in that it presents the basal facts of chemistry, mineralogy, botany, and zoölogy. It consists of the study of useful types; the standard of selection is that things shall supply the needs of men. It begins with observations of the elemental properties of matter; elements are freed from compounds by experiment. Common ores are studied; native metals contrasted with those that require reduction. Demonstration of reduction with fluxes and reducing agents. Familiarity with mineral oils. Study of construction materials, slate, stone, pigments, fuels, and the minerals from which brick, glass, pottery, etc., are manufactured. Organic materials are next treated, the scope being the history of domestic plants, a study of cereals, pottage-plants, fibre-plants, timber and lumber, tans and dyes, fruits, vegetable oils, etc. Finally, the animal kingdom is similarly treated. In the latter division the range is the utilization of animal tissues, a study of food products, fish and oyster culture, meats, hides, furs, feathers, fats and oils, pearl, bone, ivory, sponges, etc., — how these grow, and how prepared and utilized. The animal section begins with the lower organisms, and furnishes something of animal evolution.

This is an introductory course to commercial geography, physics, and chemistry, the economics of commerce, and the history of commerce. It is elementary science and gives an interpretation of and an attitude toward the things with which commerce has to deal. Lectures, assigned topics for report and laboratory work; use of materials for examination and demonstration. Four hours.

SECOND YEAR. *Commercial Geography.* The earth considered as an agent in the production and exchange of the materials treated in the study of Commercial Products. Geographic distribution of products, necessity for commerce, and natural aids and hindrances to it, etc. Text-book: Trotter, *Geography of Commerce.* Lectures by men from outside the school. Three hours.

THIRD YEAR. *Physics and Chemistry* (each one-half a year). Elements of these subjects; physical and chemical properties of materials; practical as far as possible. Text-books: Carhart and Chute, *High School Physics,* and Greene and Keller, *Lessons in Chemistry.* Laboratory Work. Four hours.

FOURTH YEAR. *Industrial Chemistry.* An advanced course in which chemistry is applied to the arts. In this course some of the basal chemical processes of manufacture are studied, such as dyeing, tanning, fermentation, etc. Tests for adulterants. In part, observational field work. Lectures, with Wurtz's *Chemistry* as collateral. Laboratory Work. Two hours.

V. HISTORY

FIRST YEAR. *Greek and Roman History* and *European History to* 800 A.D. Text-books: Fyffe, *Primer of Greek History;* Morey, *Outlines of Roman History.* Lectures and Supplementary studies from Homer, Herodotus, Sophocles, Euripides, and Virgil. (Maynard and Merrill Classics.) Three hours.

SECOND YEAR. *English History.* Survey of the subject in connection with the great European movements. Text-book: Montgomery, *Leading Facts of English History.* Two hours.

THIRD YEAR. *History of the United States.* Study of European conditions from which exploration and colonization resulted; colonial systems in the New World and separation from England; development of the United States, especially on the industrial and commercial side. Text-book: Channing, *Student's History of the United States.* Two hours.

FOURTH YEAR. *History of Commerce.* General survey of world history in its commercial aspects; trade centres and trade routes; relations of trade to the rise and fall of nations. Lectures and reports. Three hours.

VI. ECONOMICS AND CIVICS

FIRST YEAR. *Introductory Economics: Philadelphia History, Industries, and Business Interests.* History of the City in outline. Growth of industries and commerce. Men from outside the school utilized for the lectures in part. Lectures and class recitation alternate. Two hours.

SECOND YEAR. *Trade Centres and Trade Routes.* Lectures in connection with Commercial Geography.

THIRD YEAR. *Political Economy.* General outline, chiefly descriptive. Text-books: Thompson, *Political Economy*, and Thurston, *Economics and Industrial History.* Two hours.

Study of Government. Comparative, with special attention to municipal government. Text-books: Bryce, *American Commonwealth* (abridgment), and *Bullitt Bill.*

VII. BUSINESS TECHNIQUE

FIRST YEAR. *Penmanship Practice; Business Forms* and *Introductory Bookkeeping.* No text-book. Two hours.

Mechanical Drawing. Two hours.

SECOND YEAR. *Bookkeeping.* General, completed. Text-book: Bogle, *Comprehensive Bookkeeping.* Three hours.

Shorthand. Principles and outlines. Campbell, *Shorthand Charts.* (Typewriting instruction.) Four hours.

THIRD YEAR. *Office Practice.* Laying out of books, organization of an office, filling and caring for papers, copying and filing letters, observational field work. Text-book: Williams and Rodgers, *Office Routine and Bookkeeping.* Three hours.

Shorthand. Practice in the writing and reading of notes. Transcription of notes on the typewriter. Campbell, *Shorthand Charts.* Four hours. Typewriting extra hours.

FOURTH YEAR. *Commercial Law* and *Ethics of Business.* Principles of commercial procedure and laws of business. Text-book: Spencer, *Elements of Commercial Law.* Three hours.

Shorthand (elective). Speed class; drill in the writing, reading, and transcription of notes; work involving technical matter. Three hours.

RESULTS

Certain things are fairly fixed by the experience of the Philadelphia School of Commerce. Among these the foremost is that the commercial high school must be, as the manual training school has been, educational in character. Opportunities for education are quite as obvious in the scheme of studies described above as they are in either the old-time high-school curriculum or in the curriculum of the manual training school. Our curriculum is after all a modernizing and an adaptation of former high-school work; it is a development of the school on the "modern" side and seeks to give the boy his adjustment to the economic environment in which he lives. The department of commerce does for the boy who is to go into business what the mechanics arts and manual training schools do for those who are to enter upon industrial pursuits. It can do this quite as well by "commercializing" old subjects of study as by the introduction of new ones.

CURRICULUM ARRANGED BY SUBJECTS AND YEARS

Subjects of Study	First Year	Second Year	Third Year	Fourth Year
I. English Language and Literature	Latin in English 3 History of American literature; composition writing 3	History of English literature; composition and letter writing 3	Eighteenth-century literature; essay writing; practice in oral discourse 3	Nineteenth-century literature; Shakesperean drama; thesis writing 3
II. Modern Languages		German Grammar — reading and exercises 5	German — Reading, composition and conversation 3 French or Spanish — Grammar, exercises and reading 4	German — Advanced reading, conversation, and correspondence 3 French or Spanish — Reading, conversation, and correspondence 3
III. Mathematics	Elementary algebra 5	Advanced commercial arithmetic 2 Plane geometry 3		Review course and advance work in Mathematics (elective) 3
IV. Science	Commercial products; raw materials of commerce 4	Commercial geography 3	Physical science; physics and chemistry 4	Industral chemistry 2
V. History	Greek and Roman history; European history to 800 A.D. 3	English and modern European history 2	History of the United States 2	History of commerce 3
VI. Economics and Civics	Introductory economics; Philadelphia history and industries [lectures and quizzes] 2	Special lectures in connection with commercial geography	Political economy 2	Transportation, banking, and finance 3 Study of government 3
VII. Business Technique	Penmanship practice; writing of business paper; bookkeeping begun 2 Drawing 2	Bookkeeping 3 Phonography and typewriting 4	Office practice 1/3 Phonography and typewriting 4	Ethics of business and commercial law 2 Phonography (elective) 3

NOTE. — Arabic numerals indicate recitation periods (approximately 50 minutes in length) per week for one year; in many of the subjects twice the indicated number are given for half a year.

We have tried to distinguish between a school of commerce and what has come to be known as a commercial school. Rightly or wrongly the department has upheld the proposition that the future business man should know vastly more than simply to do one thing well; we have stood for the doctrine that the public high school should not degenerate into a "clerk factory," or "educational repair shop." We have also been able to give a certain amount of skill in technical work.

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